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AIR POLLUTION ABSTRACTS

28160-28522

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 28160 - 28522.

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VOLUME 4, NO. 7 JULY 1973

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

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The terms that most closely describe the information presented in the documents are arranged alphabetically.

Author Index AI-1

Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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The serial publications (journals, periodicals, etc.) being scanned number approximately 7,000. Approximately 1,000 of the most productive publications are listed with their publishers' addresses in our December 1972 issue. Additional copies of that list are available.

As another service, abstracts of all of the literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching ---more than those included in the subject index in each issue.

Feedback from our users, including suggestions of articles are always welcome.

APTIC Publications

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

Air Pollution Aspects of Emission Sources: Iron and Steel Mills - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:107, $1.00.

Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

Chlorine and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:99, $0.55.

Air Pollution Aspects of Emission Sources: Electric Power Production - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:96, $2.25.

Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

Air Pollution Aspects of Emission Sources: Sulfuric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:94, $0.65.

Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:93, $0.45.

Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:92, $1.00.

Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

Hydrocarbons and Air Pollution: An Annotated Bibliography (2 Volumes), October 1970, GPO No. HE 20.1309:75, $5.00.

Nitrogen Oxides: An Annotated Bibliography, August 1970, GPO No. HE 20.1309:72, $2.75.

Air Pollution Translations: A Bibliography With Abstracts Volume I, May 1969, GPO No. FS 2.93/3:56, $1.75.

Air Pollution Translations: A Bibliography With Abstracts Volume II, April 1970, GPO No. HE 20.1309:69, $1.00.

Carbon Monoxide, A Bibliography With Abstracts. 1966, GPO No. PHS 1503, $2.50.

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RECENT CONTRACT AWARDS

from the

Durham Contract Operations
Contracts Management Division, EPA

Contract No. 68-02-0792, RFP No. Du-73-B353 .... *$31,535*
HAZE FORMATION; ITS NATURE AND ORIGIN.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-0778, RFP No. Du-73-B361 .... *$59,381*
CONSTRUCTION AND EVALUATION OF TWO ANALYZERS FOR THE ANALYSIS OF ACETYLENE AT SUB-PART PER BILLION LEVEL.
Beckman Instruments, Inc., Advanced Technology Operations, 1530 South State College Boulevard, Anaheim, California 92806

Contract No. 68-02-0800, RFP No. Du-73-B444 .... *$50,000*
PLUME DISPERSION IN STABLY STRATIFIED FLOW OVER COMPLEX TERRAIN.
Flow Research, Incorporated, 1819 S. Central Avenue, Kent, Washington 98031

Contract No. 68-02-1083, RFP No. Du-73-A112 .... *$27,538*
PORTABLE IN PROCESS RESISTIVITY MEASUREMENT SAMPLER.
Southern Research Institute, 2000 Ninth Avenue South, Birmingham, Alabama 35205

Contract No. 68-02-0798, RFP No. Du-73-B419 .... *$38,604*
NO2 ACTINOMETER FOR FIELD USE.
Philco-Ford Corporation, Aeronutronic Division, Ford Road, Newport Beach, California 92663

Contract No. 68-02-0335, Modification No. 5 .... *$34,000*
INVESTIGATION OF EFFECTS OF NITROGEN OXIDE LEVELS ON HEALTH CHARACTERISTICS OF PERSONS IN CHATTANOOGA, TENNESSEE.
Research Triangle Institute, Post Office Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-0664, Modification No. 2 .... *$51,967*
COMMUNITY HEALTH AND ENVIRONMENTAL SURVEILLANCE SYSTEM (CHESS) - LOS ANGELES.
Regents of the University of California, University of California, Riverside California 92502

BOA No. 68-02-1006, RFP No. Du-73-A171 .... *$29,933*
UPGRADING AND UPDATING THE AREA AND POINT SOURCE INVENTORIES IN THE STATES OF WYOMING, SOUTH DAKOTA, AND NORTH DAKOTA.
GCA Corporation, Bedford, Massachusetts 01730

Contract No. 68-02-1075, RFP No. Du-73-A050 .... *$162,000*
DEVELOPMENT OF FIBROUS FILTER PERFORMANCE DATA.
GCA Corporation, GCA Technology Division, Bedford, Massachusetts 01730

Contract No. 68-02-0790, RFP No. Du-73-B445 .... *$72,500*
THE DESIGN AND FABRICATION OF TWO PARTICLE SIZE CLASSIFIER-ANALYZERS.
Environmental Research Corporation, 3725 North Dunlap Street, St. Paul, Minnesota 55112

Contract No. 68-02-0780, RFP No. Du-73-B326 .... *$55,550*
DESIGN AND CONSTRUCTION OF A PROTOTYPE SULFURIC ACID MIST MONITORING SYSTEM FOR STATIONARY SOURCES.
Walden Research Corporation, 359 Allston Avenue, Cambridge, Massachusetts 02139

Contract No. 68-02-1078, RFP No. Du-73-A083 .... *$37,792*
DEVELOPMENT AND PRODUCTION OF VALIDATED MAINTENANCE AND TROUBLESHOOTING MANUALS FOR AUTOMATIC AIR MONITORS.
Applied Science Associates, Inc., Box 158, Valencia, Pennsylvania 16059

Contract No. CPA 70-19, Modification No. 5 .... *$147,823*
REGENERATIVE LIMESTONE FLUIDIZED-BED COAL COMBUSTION AND DESULFURIZATION.
Esso Research and Engineering Company, P. O. Box 8, Linden, New Jersey 07036

Contract No. 68-02-0751 .... *$165,368*
COMMUNITY STUDIES TO PROVIDE DATA ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
Texas State Department of Health, 1100 W. 49th Street, Austin, Texas 78756

Contract No. 68-02-0783, RFP No. Du-73-B470 .... *$34,000*
DEVELOPMENT AND PRESENTATION OF AIR QUALITY MONITORING SYSTEMS TRAINING COURSE.
PEDCo Environmental, Suite 8, Atkinson Square, Cincinnati, Ohio 45246

BOA No. 68-02-1006, Task Order No. 2 .... *$25,000*
CONDUCTING A COMPREHENSIVE INVENTORY OF AREA AND POINT SOURCES IN THE STATE OF UTAH.
GCA Corporation, GCA Technology Division, Bedford, Massachusetts 01730

BOA No. 68-02-1005, Order No. 1 .... *$32,367*
UPGRADING AND UPDATING THE AREA POINT SOURCE INVENTORIES IN THE STATES OF COLORADO AND MINNESOTA.
Booz-Allen Applied Research Division, 4733 Bethesda Avenue, Bethesda, Maryland 20014

BOA No. 68-02-1005, Order No. 2 .... *$33,969*
INCORPORATE FEDERAL SOURCE INVENTORY INTO NEDS.
Booz-Allen Applied Research Division, 4733 Bethesda Avenue, Bethesda, Maryland 20014

BOA No. 68-02-1005, Order No. 3 .... *$50,000*
ACQUIRE INVENTORY DATA ON 'APPENDIX C' POINT SOURCES FOR THE NATIONAL EMISSIONS DATA SYSTEM.
Booz-Allen Applied Research Division, 4733 Bethesda Avenue, Bethesda, Maryland 20014

Contract No. 68-02-1082, RFP No. Du-73-A130 .... *$157,078*

MODIFICATION TO WET SCRUBBER DEVELOPMENT CONTRACT 68-02-0285.

A.P.T., Incorporated, Post Office Box 71, Riverside, California 92502

Contract No. 68-02-1218, RFP No. Du-73-B462 .... *$61,675*

OPTIMIZATION AND FABRICATION OF A MULTIPURPOSE PHOTOFRAGRANT DETECTOR FOR MOLECULAR POLLUTANTS SUCH AS NO2, HNO3, O3, AND HCHO.

AeroChem Research Laboratories, Inc., P. O. Box 12, Princeton, New Jersey 08540

Contract No. 68-02-1074, RFP No. Du-73-A178 .... *$577,500*

FIELD TESTING: APPLICATION OF COMBUSTION MODIFICATION TECHNIQUES TO CONTROL POLLUTANT EMISSIONS FROM INDUSTRIAL BOILERS.

KVB Engineering, Inc., 17332 Irvine Boulevard, Tustin, California 92680

Contract No. 68-02-1079, RFP No. Du-73-A068 .... *$100,000*

WET SCRUBBER LIQUID UTILIZATION.

Stanford Research Institute, 333 Ravenswood Avenue, Menlo Park, California 94025 (NOTE: Contract contains an option for an additional effort with a value of $48,200)

Contract No. 68-02-1145, RFP No. Du-73-C820 .... *$32,009*

ANALYSIS OF CLINICAL SPECIMENS.

University of Miami, Department of Epidemiology and Public Health, School of Medicine, 1600 N. W. 10th Avenue, 1129A, Miami, Florida 33152

Contract No. 68-02-1224, RFP No. Du-73-B426 .... *$45,740*

DEVELOPMENT OF METHODOLOGY FOR DETERMINATION OF CHARACTERISTICS AND PHOTOCHEMICAL REACTIVITY OF FUEL COMPONENTS AND COMBUSTION PRODUCTS.

AeroChem Research Laboratories, Inc., P. O. Box 12, Princeton, New Jersey 08540

Contract No. 68-02-1216, RFP No. Du-73-B417 .... *$34,000*

EVALUATION OF TWO BETA GAUGES ON SELECTED SOURCES USING INSTRUMENTATION PROVIDED BY EPA.

Particle Data Laboratories, Ltd., P. O. Box 265, Elmhurst, Illinois 60126

Contract No. 68-02-1220, RFP No. Du-73-B406 .... *$28,966*

DEVELOPMENT OF A SAMPLING PROCEDURE FOR TOTAL ATMOSPHERIC SELENIUM.

Southern Research Institute, 2000 Ninth Avenue South, Birmingham, Alabama 35205

Contract No. 68-02-1304, RFP No. Du-73-A202 .... *$60,500*

INSTALLATION AND INITIAL OPERATION OF THE HAKIM/CDS DATA SYSTEMS.

The Research Corporation of New England, 125 Silas Dean Highway, Wethersfield, Connecticut 06109

Contract No. 68-02-1209, RFP No. Du-73-B411 .... *$27,301*

FIELD TEST AND EVALUATE METHODS TO DETERMINE VISIBILITY.

Northwest Environmental Technology Laboratories, Inc., 300-120th Avenue, N.E., Building 2, Suite 108, Bellevue, Washington 98005

Contract No. 68-02-0793, RFP No. Du-73-B448 .... *$52,700*
ENVIRONMENTAL AND FAMILIAL DETERMINANTS OF CHRONIC RESPIRATORY DISEASE IN ADOLESCENTS.
Copley International Corporation, 7817 Herschel Avenue, La Jolla, California 93027

Contract No. 68-02-1235, RFP No. Du-73-B440 .... *$35,982*
DEVELOPMENT OF SAMPLING DEVICES FOR GASEOUS ATMOSPHERIC TRACERS.
Analytical Research Laboratories, Inc., Post Office Box 369, Monrovia, California 91016

Contract No. 68-02-1089, RFP No. Du-73-A087 .... *$41,190*
AIR POLLUTION CONSIDERATIONS IN RESIDENTIAL PLANNING.
PEDCo-Environmental Specialists, Suite 8, Atkinson Square, Cincinnati, Hamilton County, Ohio 45246

Contract No. 68-02-0788, RFP No. Du-73-B418 .... *$36,500*
LABORATORY ANALYSIS OF ATMOSPHERIC HYDROCARBONS IN LOS ANGELES REACTIVE POLLUTANT PROGRAM (LARP).
State of California, Air Resources Board, 1025 P Street, Sacramento, California 95814

Contract No. 68-02-1211, RFP No. Du-73-B423 .... *$33,277*
EVALUATION OF FILTER MEDIA FOR QUANTITATIVE COLLECTION OF PARTICULATE MATTER FROM ENGINE EXHAUST.
Arthur D. Little, Incorporated, 15 Acorn Park, Cambridge, Massachusetts 02140

Contract No. 68-02-1213, RFP No. Du-73-B431 .... *$49,200*
FOLLOW-UP OF PATIENTS RECEIVING DIAGNOSTIC DOSES of 131 IODINE DURING CHILDHOOD.
Research Triangle Institute, P. O. Box 12194, Research Triangle Park, North Carolina 27709

Contract No. 68-02-1217, RFP No. Du-73-B456 .... *$49,800*
ENVIRONMENTAL CHAMBER STUDIES OF ATMOSPHERIC AEROSOLS.
Battelle Memorial Institute, Columbus Laboratories, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-1084, RFP No. Du-73-A119 .... *$30,318*
DEVELOPMENT OF PROCESS ENGINEERING COMPUTER PROGRAM (GASEOUS POLLUTANTS) COMPATIBLE TO APEX.
University of Houston, Cullen College of Engineering, Houston, Texas 77004

Contract No. 68-02-1067, Modification No. 1 .... *$32,175*
DEVELOPING FOSSIL FUEL ESTIMATION METHODOLOGY.
Walden Research Corporation, 359 Allston Avenue, Cambridge, Massachusetts 02139

Contract No. 68-02-0580, Modification No. 1 .... *$53,717*
MATHEMATICAL MODELING OF SIMULATED PHOTOCHEMICAL SMOG.
Systems Applications, Inc., 9418 Wilshire Boulevard, Beverly Hills, California 90212

Contract No. 68-02-0799, RFP No. Du-73-B346 .... *$37,646*
FATE OF NITROGEN OXIDES IN THE ATMOSPHERE.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201

Contract No. 68-02-1201, RFP No. Du-73-B360 .... *$75,628*
DEVELOP SELECTIVE HYDROCARBON SAMPLING SYSTEM AND FIELD EVALUATE WITH CONVENTIONAL ANALYTIC SYSTEM.
Analytical Research Laboratories, Inc., P. O. Box 369, Monrovia, California 91016

Contract No. 68-02-1205, RFP No. Du-73-B439 .... *$78,370*
ASSESSMENT OF FUEL ADDITIVES EMISSION TOXICITY VIA SELECTED ASSAYS OF NUCLEIC ACID AND PROTEIN SYNTHESIS.
University of North Carolina, Office of Research Administration, South Building, Chapel Hill, North Carolina 27514

Contract No. 68-02-1206, RFP No. Du-73-B385 .... *$29,093*
SURVEY OF METHODS FOR MEASUREMENT OF NON-METHANE HYDROCARBONS IN AMBIENT AIR.
Scott Research Laboratories, Inc., Plumsteadville, Pennsylvania 18949

Contract No. 68-02-0654, Modification No. 4.. *$32,995*
DESIGN AND FABRICATION OF A TRAILER VAN LABORATORY SHELL.
Thermo Systems, Inc., 2500 Cleveland Avenue, North, St. Paul, Minnesota 55113

Contract No. 68-02-1212, RFP No. Du-73-B483 .... *$25,500*
ANALYSIS OF ENVIRONMENTAL SAMPLES COLLECTED IN CHESS.
Duke University, Office of Sponsored Programs, Durham, North Carolina 27706

Contract No. 68-02-1076, RFP No. Du-73-A033 .... *$245,159*
TECHNICAL STUDIES ON FUELS AND ENERGY AND CONSULTATION ON A RAPID RESPONSE BASIS.
Foster Associates, Inc., 1101 17th Street, Washington, D. C. 20036 (NOTE: The contract contains an option for an additional effort with a value of $254,699)

Contract No. 68-02-0746, RFP No. Du-73-B325 .... *$254,500*
EFFECTS OF PESTICIDES ON HUMAN HEALTH (IOWA).
University of Iowa, Institute of Agriculture, Community Study on Pesticides, Oakdale, Iowa 52319 (NOTE: The contract contains options for two additional years of effort in amounts of $285,151 and $293,169 respectively)

Contract No. 68-02-0539.. *$240,300*
COMMUNITY STUDY PROJECT ON THE EFFECTS OF PESTICIDES USE ON PUBLIC HEALTH.
Michigan Department of Public Health, 3500 N. Logan, Lansing, Michigan 48906 (NOTE: This contract has been amended to increase Period of Performance by 12 months. Contract modification includes options for two additional 12-month periods in the amounts of $268,470 and $284,578 respectively)

Contract No. 68-02-0752, RFP No. Du-73-B435 .... *$79,160*
COLLECTION AND ANALYSIS OF AIRBORNE SUSPENDED PARTICULATE MATTER RESPIRABLE TO HUMANS FOR SULFATES AND POLYCYLIC ORGANICS.
Battelle Memorial Institute, 505 King Avenue, Columbus, Ohio 43201 (NOTE: Contract contains an option for 24 months for an additional effort with a value of $126,405)

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1973

28160 **APTIC NO. 50323**

Beckert, J. and F. Dehli

HYGIENIC EVALUATION OF REGENERATIVE HEAT EXCHANGERS. *(Hygienische Beurteilung regenerativer Waermetauscher). Text in German. Heizung-Lueftung-Haustech., 24(2):55-58, Feb. 1973. 11 refs.*

Through the installation of regenerative heat recovery devices into ventilation and air conditioning systems in Europe annually about 600,000 Gcal of heat energy or 4 million dollars are saved. Since the regenerative heat exchangers alternately contact the exiting air flow and the entering fresh air flow, the question was studied whether undesired off-gas components, such as dust, germs, or gaseous air pollutants, are conveyed to the entering fresh air flow. Examination of the germ concentration in the off-gas flow and the entering air flow shows that the germ number of the fresh air behind the heat exchanger is only determined by the germ number of the ambient air. A similar result was obtained for gaseous pollutants. The exiting air flow transfers between 3 and 1.3 ppm carbon dioxide to the entering air flow which is a negligible amount in view of the fact of CO2 concentration of the ambient air of 300 ppm. Measurements of the concentration of peeling-off asbestos fibers from the heat storing mass showed that the concentration is far below the limit value. No traces of lithium chloride impregnation could be measured in the air flow behind the heat exchanger.

28161 **APTIC NO. 50009**

Beckert, P.

CONSTRUCTION AND OPERATION OF THE INCINERATOR ZUERCHER OBERLAND. *(Bau und Betrieb der Muellverbrennungsanlage Zuercher Oberland). Text in German. VGB Kraftwerkstechnik, 53(3):139-144, March 1973. (Presented at the VGB-Konferenz Muellverbrennung, Essen, West Germany, April 18, 1972.)*

The waste material is loaded into the charging funnel of a new incinerator by a semi-automatic crane. The refuse storage bunker has a volume of 2000 cu m. The refuse is pushed onto the grate through a shaft which is water-cooled in the lower section. The grate has been designed for a capacity of 5.0 tons/hr and for heating values ranging from 1100 to 2200 kcal. The grate area available for combustion covers 15.4 sq m. The flue gases are cooled in a Sulzer radiation boiler with a capacity of producing 12.5 tons/hr of steam. The flue gases leaving the boiler have a temperature of 230 to 240 C and a dust concentration of 2.5 to 3.0 g/cu m. They are cleaned in an electrostatic precipitator to a residual dust concentration of less than 100 mg/cu m. The slag is tapped off together with the fly ash and the dust collected in the electrostatic precipitator. The dust concentration in the cleaned gas was 74 mg/cu m. Gross operating costs were $6/ton of refuse. The gain from the sale of electricity reduces this cost to $3. In the spring of 1973 a second and third incinerator boiler unit will be taken into operation. Each unit will have a throughput of 150 tons/day.

28162 **APTIC NO. 50037**

Dunz, Wolfgang

DISCUSSION OF REMOVAL METHODS: (Diskussion der Beseitigungsmethoden). Text in German. Muell Abfall, 5(2):29-32, 1973. 12 refs.

An evaluation of the different solid waste removal methods is given The incineration method is recommended for solid waste disposal if the necessary filters and air cleaning devices are provided for. In sanitary landfills, methane gases may form due to the anaerobic decomposition processes; the methane can escape into the air without passing through air cleaning devices. The composting method is based on aerobic decomposition conditions; the developing gases do not have any bad odor. However, sometimes the aerobic process changes into an anaerobic one which provides bad odors which may cause air pollution even outside the composting plant.

28163 **APTIC NO. 50067**

Gorter, K., J. van der Kooij, J. de Lange, and A. J. Elshout

ABATEMENT OF NITROGEN OXIDE EMISSIONS. EXPERIMENTS WITH STEPWISE FIRING OF NATURAL GAS PERFORMED AT THE FLEVO POWER PLANT. *(Vermindering van de emissie van stikstofoxiden. Proeven met het getrapt stoken van aardgas in de Flevocentrale). Text in Dutch. Electrotechniek, 51(2):79-86, Feb. 1973. 7 refs.*

Experiments to reduce the nitrogen oxide emission from an oil and natural gas fired utility boiler with a maximum continuous rating of 590 tons/hr of steam under natural gas firing conditions are reported. The boiler is equipped with two rows of four combined oil-gas burners both in the front and the back wall of the furnace. The nitrogen oxide concentrations in the flue gas were continuously recorded by a Dynasciences model NX-130 monitor. The most effective reduction of the nitrogen oxide emission by about 50% was possible by increasing the gas flow to the burners of the upper rows and increasing the gas flow to the remaining burners, in leaving the airflow to all burners unchanged. The method of off-stoichiometric firing of natural gas was suitable for reducing the nitrogen oxide emission without adversely affecting boiler efficiency, flexibility, and safety. Increasing the air excess from 0.5 to 2% caused an increase in the nitrogen oxide emission, particularly under top load conditions.

28164 **APTIC NO. 50073**

Hammond, D. C. and A. M. Mellor

ANALYTICAL PREDICTIONS OF EMISSIONS FROM AND WITHIN AN ALLISON J-33 COMBUSTOR. *Combust. Sci. Technol., 6(5):279-286, Jan. 1973. 20 refs.*

An analytical model which considers gas-phase processes was developed for gas turbine combustors. In the model the fluid mechanics of combustors are rather crudely approximated for reasons of mathematical tractability, and the perfectly stirred reactor constitutes the basic computational component of the model. The analytical model was used to make predictions, for an analytical combustor, which were then compared with internal and exit plane measurements of temperature, carbon monoxide concentration, and nitric oxide concentration. The internal data could be reasonably well approximated by the predictions, but the variations in exit plane values for certain changes in the operating conditions were incorrectly predicted. These discrepancies resulted, at least partially, from heterogeneous effects. The comparison of analytical predictions with experimental data showed that more accuracy is required in the a priori estimation of the model paramenters, and that the three most important profiles, temperature, CO centration, and NO concentration must be considered simultaneously. Strong kinetic effects were observed, in both the C-H-O and N-O systems, thus invalidating any assumption of chemcial equilibrium. A completely gas-phase model would be inadequate.

28165 **APTIC NO. 50356**

Henkel, Hans-Joachim, Christian Koch, Hana Kostka, and Eugen V. Szabo

A COMPACT GAS GENERATOR FOR POLLUTION CONTROL OF COMBUSTION PROCESSES. *(Kompakter Gasgenerator zur schadstoffarmen Durchfuehrung von Verbrennungsvorgaengen). Text in German. Siemens Forsch.-Entwicklungsber., 2(1):58-62, 1973. 2 refs.*

A prototype of a new Siemens gas generator especially designed for spark ignition engines, and exhaust emission measurements performed on such engines are described. The gas generator is used to convert gasoline into gaseous fuel to be used by the spark ignition engine by means of a non-noble metal catalyst at very low air-fuel ratios. Air-fuel ratios as low as 0.05 can be reached by means of adequate catalysts. The nearly isothermal gasification process, resulting from simultaneous exothermal and endothermal processes taking place in the gas generator, provides a high degree of flexibility for load changes. The resulting fuel gas has octane ratings of over 100, independent of that of the gasoline used, which makes total elimination of lead, and increased compression ratios possible. Comparative tests run with conventional and fuel gas powered spark ignition engines revealed the equality of the engine performances at air excess coefficients of 1.0 for conventional, and of 1.2 for gas generator-coupled engine. Compared to the carbon monoxide and nitrogen oxide emissions from conventional gasoline engine, the CO and nitrogen oxide emissions from a fuel gas-powered engine accounted for 1/16 and for 1/35 of the corresponding emissions from the conventional engine. Similar reduction in the unburned hydrocarbon emission, consisting mostly of methane, was also observed. Also cold start emissions are reduced by gas generator-fed engine.

28166 **APTIC NO. 50217**

Hofmann, W. M.

STEAM HUMIDIFIERS VERSUS AIR WASHER. *(Dampfbefeuchter kontra Luftwaescher). Text in German. Heizung-Lueftung-Haustech., 24(2):41-47, Feb. 1973. 3 refs.*

A comparison between a steam humidifier and an air washer reveals that the latter produces a considerable amount of dust. With some air washers the dust production per nozzle (diameter 4.7 mm) was 1000 particles/l air of more than 0.5 micron, or 0.16 mg/cu m. In comparison the dust concentration of the atmospheric air in Winterthur amounts 0.15 to 0.20 mg/cu m. Thus, the dust quantity produced by the air washer is at least as large as the natural dust concentration in the atmospheric air, with the number of small particles being much higher than in atmospheric air. A filter has to follow the air washer or the water has to be entirely desalinized, which is expensive. The steam washer produces less dust (about 0.05 to 0.10 mg/cu m air). This quantity is further reduced if the water is preliminarily treated. The steam humidifier cost is equal to the air washer, or even a little less. The investment costs are the same. Steam humidifiers require less space and the germ multiplication is lower than with air washers.

28167 **APTIC NO. 50048**

Joachim, H.

REFUSE INCINERATION PLANT DEURNE - CONSIDERATIONS REGARDING THE STATE OF THE ART OF THE REFUSE INCINERATION PLANTS. *Muellverbrennungsanlage Deurne - Betrachtungen zum Stand der Technik der Muellverbrennungsanlagen. Text in German. Aufbereitungs-Technik, 14(3):166-172, 1973. 14 refs.*

Refuse incineration in the Deurne plant in Antwerp is discussed. The continuous grate capacity is higher than 3.6 tons/hr; 25,000 tons/yr are incinerated; and there are two self-contained incineration grates available. Fuel oil consumption in 6 l/ton of refuse. The weight loss during incineration is 30%, the refuse volume is reduced by 90%. The waste material is charged through water cooled shafts. Oil hydraulically operated multizone forward stoking grates are installed in the 50 cu m combustion chambers. The flue gases are cooled to the operating temperature of the dust collector by fresh air. Centrifugal collectors multi-cyclones are used for dust removal. The maximum allowable dust concentration in the cleaned gas is 0.4 g/cu m, the average concentration at continuous operation 0.3 g/cu m. These values are based on saturated flue gas with a carbon dioxide concentration of 7%. The stack rises to a height of 35 m. Incineration is a solid waste disposal method which will gain further importance in future. Certain parts of the incinerator still require improvement, for instance the cleaning of the flue gas, or the cooling of the flue gases.

28168 **APTIC NO. 50013**

Kirsch H., K. Kautz, and R. Singh Dev

STUDY OF FINE DUSTS WITH AN ANALYTICAL ELECTRON MICROSCOPE. *(Die Untersuchung von Feinstaeuben durch ein analytisches Elektronenmikroskop). Text in German. VGB Kraftwerkstechnik, 53(3):195-199, March 1973.*

Dust samples from electrostatic precipitators of four incinerators burning industrial refuse were examined as to their concentration of fluorine compounds. An analytical electron microscope which combined the properties of electron microscope with those of an electron microprobe was used for the examinations. The electron beam passed a double condenser system and electromagnetic detectors. A mini lens behind the detector focused the electron beam on the sample producing an X-ray fluorescence radiation emitted in all directions. But only the radiation leaving at an angle of 45 deg was recorded by the non-dispersive detector and the two spectrometers. Each spectrometer had four analyzing crystals. The chemical and fine structure micro-analyses were carried out at 80 kV. In more than 20 individual samples from each incinerator, sodium fluoride was the most frequent fluorine compound. In the fly dust from incinerators for domestic refuse, calcium and lithium fluoride were most frequently identified.

28169 **APTIC NO. 50058**

Lohs, Karlheinz

CHEMICAL TECHNOLOGY AND ENVIRONMENTAL PROTECTION. *(Chemische Technik und Umweltschutz). Text in German. Chem. Tech. (Berlin), 25(3):130-134, March 1973. 2 refs. (Presented at the East German Academy of Sciences.)*

Substance conversions were always carried out by the chemical industry under the aspect of optimum economic use. As a consequence, all by and waste products which could not be profitably recovered were discharged into the air, water, or soil. Although it has been known for a long time that the large quantities of sulfur, nitrogen oxides, metals, carbon compounds, and halogens thrown into the atmosphere have a high material value, the cost and effort to recover these offproducts were far too high. Another factor which contributed to the environmental pollution by the chemical industry is the fact that much more is known about the synthesis of primarily organic chemical compounds than about their effects in humans, animals, or plants. For the majority of compounds this knowledge is absolutely unsatisfactory. The number of pollutants for which maximum allowable emission concentrations have been worked out is far too low in view of the fact of the much larger number of economically important chemicals. For some industrially important gases such as sulfur dioxide, carbon monoxide, ammonia, and chlorine, automatically recording units are available, but the analysis of all known and possible toxicants is still on a beginning level.

28170 **APTIC NO. 50375**

Mandel, Heinrich

ELECTRICALLY DRIVEN AUTOMOBILES. A CONTRIBUTION TO THE SOLUTION OF TRAFFIC PROBLEMS IN DENSELY POPULATED AREAS. *(Electrisch angetriebene Kraftfahrzeuge. Ein Beitrag zur Loesung von Verkehrsproblemen in Ballungsgebietsen). Text in German. Elektrizitaetswirtschaft, 72(4):81-83, Feb. 19, 1973.*

Electricity can be produced from various sources without loss of quality. Moreover, power plants seem to capable of coping with the increased power demand through electric cars. As a battery for electric cars, the lead-acid battery proved to be most suitable Manufacture and maintenance of the battery is simple, and the price is acceptable, but the weight is high. The silver-zinc battery is lighter but more expensive at a lower lifetime. Under these circumstances the electric drive can be used only for automobiles which span limited distances of 50 to 100 km, e.g. buses, small trucks, and trash collection trucks. But it can bring a considerable relief in cities with regard to automobile emissions. For this reason, the further development of the electric drive is justified.

28171 **APTIC NO. 50072**

Mencher, Simon K., Adel Hakki, and Michael S. Rolinski

ENVIRONMENTAL IMPACT AS A CRITERION IN HEATING SYSTEM DESIGN. *ASHRAE (Am. Soc. Heating, Refrig. Air Cond. Engrs.) J., 15(2):37-39, Feb. 1973.*

Step-by-step development of an environmentally optimum heating system for apartment buildings with 5250 dwelling units being developed on Welfare Island, New York City, is described. Natural gas was eliminated as a fuel because of the New York State availability problem. A computerized dispersion model revealed that the maximum contribution to ground-level pollutant concentrations with individual boilers would be 3.6 times that which would result with a 250-foot stack on a central boiler installation firing the same fuel, which led to elimination of the choice of individual boilers. Such boilers were first intended to operate on No. 2 oil. Then, a theoretically best hydronic system was compared against the electric heating system, taking the long-term electricity availibility into account. It was determined that the quantity of fossil fuel that would be fired in a central boiler to supply energy to the theoretically best hydronic system would be about 23% less, over a whole heating season, than would be fired by power generating stations in supplying electrical energy for the electric space heating alternative. The sulfur dioxide, particulate, nitrogen oxides, carbon monoxide, and benzo-a-pyrene ground-level concentrations as contributed by the central boiler installation would be 8, 37, 27, 95, and 7 times higher than the corresponding contributions by the electric heating. As a result of the environmental optimization, an electric system was chosen over fossil-fuel fired central boiler installation.

28172 **APTIC NO. 50023**

Plank, F. W.

AN APPRECIATION OF THE UNIFLOW-COUNTERFLOW REGENERATIVE KILN. *(Beurteilung des Gleichstrom-Gegenstrom-Regenerativofens). Text in German. Zement-Kalk-Gips (Wiesbaden), 25(3):119-123, 1973. (Presented at the Bundesverband der Deutsche Kalkindustrie, Technische Tagung, 10th, Cologne, West Germany, Nov. 2-3, 1972.)*

The uniflow-counterflow kiln has a highly developed thermal economy, characterized by a favorable thermal efficiency, due to its exit-gas heat return, its uniflow conditions in the burning zone, and its counterflow for the exit-gas. Two coke-fired shaft kiln s were converted into the counterflow type. Their product corresponded to that of good rotary kiln lime. Operational troubles tend to develop in this type of kiln due to severe thermal and mechanical loading of the lining, the dust balance, occasional interruptions in the movements of the kiln process material, and problems in the electrical control system. Because of the high degree of waste heat recovery, the kiln has high thermal sensitivity and close tolerances with regard to the heat evolved. The measuring instrumentation of the kiln must be properly suited to this set of conditions.

28173 **APTIC NO. 50381**

Rasch, Rudolf

EVERYTHING RETURNS TO DUST. *(Alles wird wieder zu Staub). Text in German. Umwelt Duesseldorf, 3(1):49-53, 1973. 11 refs.*

A comparison of all available solid waste disposal methods (sanitary landfill, composting, and incineration) shows that a controlled volume reduction within 1-2 hr is only feasible with incineration. With the sanitary landfill the decomposition processes are most difficult to control. It is granted that a complete combustion is difficult to achieve in small incinerators. Therefore, they should not be allowed in residential areas. In large incinerators complete combustion is achieved by uniform charging, continuous operation, and high combustion chamber temperature. Analyses in the large incinerator in Duesseldorf revealed that the amount of volatile organic acids in the waste gases were on the lower detection limit. Of the 4,000,000 t/yr sulfur dioxide emitted in West Germany, 12,000 tons come from incinerators. The latter emit 5000 t/yr nitrogen oxides, 8000 t/yr hydrogen chloride, 50,000 t/yr hydrogen fluoride and 4,000,000 t/a dust. Nothing is known about the emission of heavy metals. An examination in power plants and incinerators has shown that toxic heavy metals such as lead, zinc, arsenic, and others are deposited in various sections of the heat exchanger which means that a considerable portion is not emitted into the environment with fly dust.

28174 **APTIC NO. 50219**

Rixmann, W.

THE SIEMENS GAS GENERATOR (CRACKING CARBURETOR) FOR OTTO ENGINES. *(Der Siemens-Gasgenerator (Spalt-Vergaser) fuer Ottomotoren). Text in German. Automobiltech. Z. (Stuttgart), 75(4):148-149, 1973. 5 refs.*

The new Siemens gas generator produces a combustion gas from a liquid fuel, such as lead-free gasoline or diesel oil, by a catalytic method. Apart from some air, part of the exhaust gas from the engine is passed over the catalyst too. The exothermal reaction with air has the task of maintaining a high enough temperature to start and maintain the endothermal process of gas formation. The entire process is controlled by an air/exhaust gas regulator ahead of the catalyst so that both reactions yield an isothermal process with a temperature of 800 C. The gasoline quantity is electronically regulated by electromagnetically controlled nozzles. A heat exchanger cools the hot cracking gases and heats the combustion air of the unit and the injected gasoline. For Otto engine operation a water cooler precedes the air/gas mixer for cooling the gas to 100 C. First results of experiments with a 2-liter engine and gas operation with a lambda of 1.2 brought much lower carbon monoxide and nitrogen oxide concentrations. The concentration of CO was 0.09% and of NOx 40 ppm, versus 1.5% CO and 1400 ppm NOx with gasoline operation, fuel-to-air ratio of lambda 1.0, and comparable operating conditions. A reduction of the hydrocarbon concentration is also reported but is not expressed in numbers.

28175 **APTIC NO. 50134**

Rump Georg and Alfred Kunst

DAMAGES ON CONVERTER WASTE HEAT BOILERS IN STEEL WORKS. *(Schaeden an Konverter-Abhitzekesseln in Stahlwerken). Text in German. TUE(Tech. Ueberwach.), 14(3):65-71, March 1973. 3 refs.*

Damages in converter waste heat boilers are mainly due to constructional mistakes (51.5%), to operational mistakes (42%), and to the combined effect of both. Analysis of the various damages provides valuable information concerning proper design and operation. Damages that occurred in waste heat boilers of the steel industry are discussed and preventive measures are pointed out. To give one example, pipe fractures occurring during melting bath explosions are mostly due to an oversupply of carbon monoxide in the off-gas. The causes for the high CO concentration are high vapor and water quantities in the vicinity of the converter mouth which blow out the converter flame. The design of the oxygen lance is mostly responsible for this. It is important to provide for sufficient water cooling of the oxygen lance. An accurate maintenance of the fuel to air ratio helps to prevent an inadmissibly high CO concentration in the off-gas.

28176 **APTIC NO. 50326**

Schoellhammer, Richard

NATURAL GAS - ITS IMPORTANCE AS A FUEL SUBSTITUTING FOR THE TRADITIONAL POLLUTING FUELS. *(Am Erdgas haengt, zum Erdgas draengt doch alles). Text in German. R.A.S./Rohr-Armatur- Sanitaer-Heizungstech., 28(3):230-234, March 1973.*

State-of-the-art and future prospectives of natural gas as a substitute for traditional polluting fuels in the economy of the Europen Economic Community and especially of West Germany are outlined. The percentage of natural gas among all energy carriers to be used in the countries of the European Economic Community is expected to rise to 15-18% by 1980, replacing coal. The corresponding increase expected for West Germany will be from 6% in 1970 to 13% in 1980. The growth rate of the natural gas production of West Germany in 1971 reached an unprecedented 32%. While relying heavily on natural gas supplies from the Netherlands, West Germany will be able to meet 45% of its natural gas demand from own sources even as late as 1980. A spectacular increase from 9% in 1970 to 18-20% in 1975 is forecast for the percentage of natural gas in the energy consumption of centrally heated dwelling units. The increase in the proportion of natural gas for space heating purposes within the household energy needs was from 9.9% in 1970 to 74.4% in 1971. The massive, and ever-increasing use of natural gas for space heating is as a major step toward a considerable abatement of urban air pollution.

28177 **APTIC NO. 50077**

Sumi, Kikuo and Yoshio Tsuchiya

COMBUSTION PRODUCTS OF POLYMERIC MATERIALS CONTAINING NITROGEN IN THEIR CHEMICAL STRUCTURE. *J. Fire Flammability, vol. 4:15-22, Jan. 1973. 11 refs.*

The amount and toxicity of combustion products of acrylic fiber, nylon-6, wool, urea-formaldehyde foam, and rigid urethane foam were studied. Samples of 400 to 2400 mg of each material were burned in a three-neck flask maintained at 800 C and open to the atmosphere. Heating for 2.5 min was followed by a 30 min cooling period at the end of which gas samples were taken. The specific amounts of hydrogen cyanide formed from acrylic fiber, nylon, wool, urea-formaldehyde foam, and rigid urethane foam were 0.095-0.193, 0.020-0.070, 0.018-0.054, 0.015-0.042, and 0.008 g/g of sample. The corresponding values for carbon monoxide were 0.076-0.170, 0.095-0.38, 0.114-0.22, 0.032-0.077, and 0.092-0.23 g/g, respectively. Toxicity indices, representing a ratio of the experimentally determined concentration of a toxic product expressed as volume of product when 1 g of material is decomposed and the products are diffused in a volume of 1 cu m, to the concentration of the same product that is fatal or dangerous to man in a 30-minute exposure, were determined for HCN and CO. The dangerous concentrations of HCN and CO were 135 and 4000 ppm. The toxicity indices thus obtained for HCN from arcrylic fiber, nylon, wool, urea-formaldehyde foam and rigid urethane foam were 0.58-1.19, 0.12-0.43, 0.11-0.33, 0.10-0.26, and 0.05. The corresponding indices calculated for CO were 0.02-0.03, 0.02-0.08, 0.02-0.04, 0.01-0.02, and 0.02-0.05. The results illustrate the potential danger of HCN to a fire environment when materials containing nitrogen are involved in a fire.

28178 **APTIC NO. 50018**

Sutter, Ernst

FLUORIDE MEASUREMENTS IN ALUMINUM PLANTS. *(Fluoridmessungen in Aluminiumhuetten). Text in German. Staub, Reinhaltung Luft, 33(3):114-117, March 1973.*

Fluorides were measured in Swiss aluminium smelting plants to assess the fluorosis hazard. Atmospheric conditions affected the efficiency of artificial ventilation. Ion selective electrodes were used to determine fluorides in personal samplers attached to workers. Measurements were taken during various seasons. The average values fluctuated between 0.2 and 1.5 mgF/cu m. No statistically proved dependence on the weather could be detected, but the wind around the furnace workshop did exert a considerable influence. By cutting out the influence of the wind on the ventilation system of the workshop, the fluoride concentration could be reduced. Adequate conduction of the air inflow into the electrolysis workshop is of great importance for a low fluoride concentration.

28179 **APTIC NO. 50014**

Thiel, P.

SWITCH OF SOFT COAL OPERATION OF A MELTING BOILER TO NATURAL GAS. *(Umstellung eines Braunkohlen-Schmelzkessels auf Erdgas). Text in German. VGB Kraftwerkstechnik, 53(3):144-150, March 1973. 2 refs.*

With relatively low costs, a soft coal boiler could be switched to successful operation with natural gas. However, the waste gas temperature was initially 30 C higher than with soft coal operation and 20 C higher than with hard coal operation, despite the installation of a 640 sq m economizer. The waste gas temperature could be reduced to 163 C. Since natural gas is sulfur free, the operation could take place with waste gas temperatures of 100 C which would bring an improvement of the efficiency by 4%. The conversion to natural gas operation brought the following advantages: lower environmental pollution, fewer personnel, lower repair costs, greater availability, and better use of the boiler.

28180 **APTIC NO. 50057**

Vetter, H.

PROBLEMS AND LIMITS OF MANURE FERTILIZATION. *(Probleme und Grenzen der Guelleduengung). Text in German. Landtechnik, 28(5):154-158, March 1973.*

Four problems concerning manure fertilization are discussed. The first one deals with the odors arising at manure application. They can be reduced if the manure is aerated to decompose organic matter during storage. Should an aeration be impossible, it is important to avoid any access of oxygen while the manure is pumped into the transporting container. Fewer odors are emitted if the manure is applied to the fields on cool, cloudy days. It is important that the manure is rapidly worked into the soil. With the application of high quantities of manure, odors cannot be avoided. The other problems of manure application involve pollution of ground and drinking water, the limits of yield increase through application of increased amounts of manure, and the limits set by the waste disposal law for the application of manure. The limit of useful nitrogen supply is reached with the application of 45 cu m pig manure per hectare.

28181 **APTIC NO. 50339**

Wenzel, W., H. W. Gudenau, and E. Wieting

NEW WAYS FOR THE PRODUCTION OF BLAST FURNACE COKE. *(Neue Wege der Erzeugung von Hochofenkoks). Text in German. Aufbereitungs- Technik, 14(3):136-141, 1973. 6 refs.*

Two new modes of producing blast furnace coke are presented. One is a modified grate coking procedure with the formation of regular channels for the combustion of air in the charging system. This results in direct heating of the coal to be coked because of partial combustion of the degasification products. At the same time, a suitable product size is ensured by adding hematite iron ores. The second method produces equal-sized coke in standard coking chambers. The initial products are coke pellets which guarantee equal-sized coke after the coking process by having them coated with thin hematite shells. The new coking processes have the advantage of requiring low investment and operating costs, and it is simple to limit the dust and smoke development. An adjoining power plant could use the chemically bound heat as well as the perceptible heat of the process gas without requiring extra dust collectors.

28182 **APTIC NO. 50331**

Wogrolly, Ernst

REMOVAL OF PLASTIC WASTES TODAY AND TOMORROW. *(Beseitigung von Kunststoffabfaellen Heute und Morgen). Text in German. Umweltschutz Staedtereinig. (Vienna), no. 2:25-29, 1973. 14 refs.*

The annual refuse quantity in Austria amounts to 5 to 6 million cu m of which 2-6.5% is plastic waste. The percentage of polyvinyl chloride in the refuse is about 0.5%, and even in 1980 will not exceed 1%. When being burned in adequate furnaces, plastic wastes decompose into carbon dioxide and water. Measurements of the flue gases showed that the carbon monoxide content does not exceed 0.05% if sufficient combustion air is added. Tests conducted with polyvinyl chloride showed that only a small percentage of hydrochloric acid is in the flue gas. The main quantity was chloride in the ash. Measurements in the area surrounding the incineration plant showed an average value of 10 milligrams Cl/cu m air, which is below the average value of the air in the center of Berlin. Even at a concentration of 3 wt%/hr of polyvinyl chloride burned the chloride content in the air did not increase.

1972

28183 **APTIC NO. 50314**

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

CONVERSION OF MOTOR VEHICLES TO GASEOUS FUELS TO REDUCE AIR POLLUTION: POSITION PAPER. *Preprint, 13p., April 1972, 3 refs.*

Substantial reduction in emissions from new motor vehicles powered by gasoline engines is expected by the mid-1970 s, but the urgent need for improvement of air quality in certain metropolitan areas has focused attention on the possibility of converting existing vehicles to gaseous fuels. Based on presently available technology and on probable availability of gaseous fuels (e.g., liquefied petroleum gas, liquefied natural gas, and compressed natural gas), the Environmental Protection Agency recommends the conversion to gaseous fuels of fleet-operated vehicles in areas where logistical and economic considerations are favorable in terms of availability of fuel and conversion equipment, and where air pollution problems are attributable to motor vehicles. Except on these terms, conversion to gaseous fuel is not warranted at this time for purposes of air pollution control. If diversion of natural gas from electric power generation were required to supply large quantities for automobiles, increased power plant emission of sulfur dioxides could offset the benefits from reduced carbon monoxide emissions. Also, conversion of space heating to natural gas could produce important reductions in SOx, nitrogen oxide, and particulate emissions, and could be more effective in improving overall air quality than conversion of fleet vehicles. Data on emissions (NOx, hydrocarbons, and CO) from gaseous-fueled vehicles are presented. Costs of the fuels and safety problems associated with their use are discussed.

28184 **APTIC NO. 50259**

Ashby, H. Anthony

FINAL REPORT: EXHAUST EMISSIONS FROM A MERCEDES-BENZ DIESEL SEDAN. *Office of Air Programs, Test and Evaluation Branch, Rept. 73-6, APTD-1381, 10p., July 1972.*

The exhaust emission characteristics of a diesel engine powered passenger car were studied to determine the effect of the system on emission levels of hydrocarbons, carbon monoxide, carbon dioxide nitrogen oxides, and particulates under various driving conditions and engine parameters. Mass emissions of all three gaseous pollutants were at or below the required 1975 levels. Average NOx emissions were slightly more than four times the 1976 levels. Average CO2 emissions were about 50% of the CO2 emissions from gasoline-powered cars. Particulate emission levels were about seven times higher than those from cars fueled by leaded gasoline and about 20 times higher than those from cars fueled by non-leaded gasoline.

28185 **APTIC NO. 50159**

Barniske, L.

WASTE DISPOSAL BY INCINERATION. *(Muellbeseitigung durch Verbrennung). Text in German. Schriftenreihe Ver. Wasser-, Boden-Lufthyg. (Berlin), no. 38:219-226, 1972. 7 refs.*

In the Federal Republic of Germany about 30 large incinerators are presently in operation burning the waste of 20% of the population. The heating value of trash in the FRG ranges between 1200 and 2000 kcal/kg on the average, with the minimum being 800 kcal/kg and the maximum 3000 kcal/kg. The combustion chambers of incinerators are mostly operated with temperatures between 850 and 1200 C. The solid residual matter from incineration amounts to 10 to 16% of the initial volume; the flue gases amount to 4000 and 5000 cu m/t trash. The flue gases carry about 2 to 10% of the charged trash weight in form of fly ash. According to legal regulations the dust emission by incinerators may not exceed 150 mg/cu m. This concentration is reached only with electrostatic precipitators. For the cleaning process in electrostatic precipitators the flue gases must be cooled to at least 350 C. In most cases the most efficient form of flue gas cooling is the use of the flue gas heat for power production or for heating. If this is not feasible the combined incineration of trash and sewage sludge provides an alternative with the liberated heat used for drying the sludge. Measurements of the hydrogen chloride mission in the vicinity of incinerators in Germany has shown that the maximum allowable emission concentration laid down in the VDI-guidelines has not been exceeded in any one case.

28186 **APTIC NO. 50298**

Eccleston, B. H. and R. W. Hurn

EFFECT OF FUEL FRONT-END AND MIDRANGE VOLATILITY ON AUTOMOBILE EMISSIONS. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, RI 7707, 73p., 1972. 6 refs.*

The effects of gasoline characteristics such as front-end and midrange volatility on auto emissions were studied on 15 1968-1970 model autos and eight fuels were tested at ambient temperatures ranging from 20 to 95 F. Also photochemical reactivity data and distribution of hydrocarbon and nitrogen oxides during the test cycle are presented. Evaporation decreased with decrease in either front-end or midrange fuel volatility. For reducing fuel tank loss, decreasing front-end volatility by 3-lb Reid vapor pressure units was more effective than by decreasing midrange volatility by 40 F. In reducing carburetor loss, either fuel modification was about equally effective. Volatility effects in terms of percentage change were similar for vehicles with and without evaporative controls. However, the amount of the loss from vehicles with controls was a small fraction of the loss from vehicles without control. Exhaust measurements showed that a decrease in fuel front-end volatility caused a small increase in hydrocarbon and carbon monoxide emissions from 1968-1969 vehicles; the reverse of this occurred at the higher ambient temperature in the 1970 vehicles. A midrange volatility change in the fuel gave either increase or decrease in exhaust hydrocarbon emissions, depending upon the fuel front-end volatility and the ambient temperature. Vehicle-to-vehicle differences were large in comparison with the significant fuel-to-fuel differences. The ambient temperature has a highly significant influence on emissions and fuel volatility interacts significantly with ambient temperature in affecting emissions. Distributions of hydrocarbon and nitrogen oxides in the test cycle were influenced by volatility and by ambient temperature. Replacement of front-end olefin with the corresponding saturate reduced the photochemical reactivity of evaporative losses significantly but had negligible influence on exhaust emissions. The effect of fuel volatility on carburetor evaporation losses was also studied.

28187 **APTIC NO. 50352**

Fehr, Eugen

OIL-FIRING AND ENVIRONMENT WITH SPECIAL REGARD TO THE BURNER AND BOILER. *(Oelfeuerung und Umwelt unter besonderer Beruecksichtigung von Brenner und Heizungskessel). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e.V., Reutlingen, (West Germany), INTHERM, Int. Fachmesse Oelfeuerung Gasfeuerung, 12th, Stuttgart, West Germany, 1972, p. 41-48.*

As inspection of oil-fired heating systems in Switzerland yielded that 40% of all those inspected including the newest did not comply with the minimum requirements for air hygiene. The burners available on the market if expertly adjusted are capable of keeping up with the requirements. The boilers are less well constructed to fulfill the demands for environmental protection. They have a bad long-term efficiency and are noisy. The combustion chambers are frequently dimensioned so that even with the best burner adjustment the combustion is incomplete. The packaged unit is recommend where burner and boiler are matched to each other.

28188 **APTIC NO. 50008**

Hashimoto, Hoichi

QUANTITATION OF MAIN COMPONENTS IN SUSPENDED PARTICULATES -- FLUORESCENCE X-RAY ANALYSIS. *(Taiki-chu fuyu ryushi-jo bushitsu no shuseibun genso no teiryo -- Keiko X-sen ho ni yoru bunseki). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 45 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Reports for 1971). p. 24-33, Aug. 1972.*

The main components of suspended particulates were analyzed by a nondestructive method. The principles of fluorescent spectrophotometry are mathematically presented. In the experiment, the standard materials were prepared by pulverized and molded alumina, calcium oxide, ferrous oxide, and silicon dioxide mixed with sodium bicarbonate and stearic acid. The samples tested were the room dusts collected in a bag filter, settling particles, and suspended particulates collected by membrane filters. The filters were burned to ashes and used. The results showed that the bag filter material consisted of 8.26 wt% of iron; 7.98% calcium; 11.7% silicon and more than 20% aluminum. The settling particles contained 12.6% Fe; 4.97% Ca; 18.7% Si; and 2.5% Al. The four samples of suspended particulates ranged from 5.8-6.8% Fe; 5.5-7.0% Ca; 14.1-18.7% Si; and 3.0-4.5% Al.

28189 **APTIC NO. 50296**

Heronemus, William E.

THE UNITED STATES ENERGY CRISES: SOME PROPOSED GENTLE SOLUTIONS. *Preprint, American Society of Mechanical Engineers, New York and Inst. of Electrical and Electronics Engineers, New York, p. 229-278, 1972. 40 refs. (Presented at the American Society of Mechanical Engineers-Institute of Electrical and Electronics Engineers Joint Meeting, Springfield, Mass., Jan. 12, 1972.)*

Recent literature concerning the energy crisis has failed to give appropriate emphasis to two major sources of pollution-free energy: large-scale wind power and large-scale ocean thermal gradient machines. These sources coupled with a hydrogen plus fuel cell distribution and electricity generation concept offer a chance to place the entire electric utility and transportation industry in the U. S. on a pollution-free invariant energy basis. Potential wind power is estimated for six wind stations using 50 or 210 ft diameter bladed turbines and having less than 30 mph annual average wind speeds. Investment costs and earnings are compared for three wind-power-hydrogen-fuel-cell power systems: a system producing hydrogen for coal gasification, a system providing pure gaseous hydrogen by a pipeline to a multiplicity of fuel-cell central stations, and a system with facilities for liquefaction and tank storage of liquefied hydrogen. Offshore hydrogen generating stations are proposed for conversion of ocean thermal gradients in the Gulf Stream, the Gulf of Mexico, and off Miami. An acceptable technology exists for all aspects of the wind power and ocean thermal gradient conversion processes: a five-year development program could improve that technology. The major components of the systems could be built by assembly-line techniques in existing aircraft, automobile, or armament factories.

28190 **APTIC NO. 50228**

Hess, K., W. Leuckel, and E. Minx

INCINERATION OF ORGANIC WASTE WATERS. *(Aufarbeitung von organisch verunreinigten Abwaessern durch Verbrennungsporozesse). Text in German. Chem.-Ing.-Tech., 44(5):325-332, May 1972. 11 refs. (Presented at the Annual Meeting of Technologists, held in Nuremberg, Sept. 21-23, 1971.)*

Combustion processes and emissions occurring during the incineration of organic waste waters, simulated by a fuel oil-in-water emulsion in a natural gas flame, were studied. Simultaneous, direct evaporation, possibly following preliminary evaporation, and incineration in the flame at a temperature range of 800-1200 C and at an air excess coefficient of about 1.10, was applied. The destruction rate was about 1 t/hr of waste water with a natural gas consumption of 45 N cu m/hr. Stable flame up to a load of 1.5 t/hr of waste water was observed. When pure water was burned in a natural gas flame, the methane, hydrogen, and carbon monoxide content of the waste gas sampled 3 m from the burner was less than 0.02%; while such a value was reached first at 4100 mm when the oil emulsion in water was burned. The formation of nitrogen oxides, particularly of nitric oxide, during the incineration of nitric acid-containing waste water in similar equipment was considerably reduced by the application of a reducing atmosphere in the first stage of a two-stage combustion chamber.

28191 **APTIC NO. 50152**

Kottmann, E.

EXPERIENCES WITH THE OPERATION OF MEDIUM SIZE INCINERATORS. *(Erfahrungen beim Betrieb von Abfallverbrennungsanlagen mittlerer Groesse). Text in German. Luftverunreinigung, 1972:36-37, Dec. 1972. 2 refs.*

Medium-size incinerators have throughput capacities up to 1500 kg/hr. Dust concentration measurements taken in incinerators have revealed that the limit value of 150 to 200 mg dust/cu m set by the Technical Directives for the Maintenance of Clean Air is in most cases exceeded. Although a combustion temperature of 800 C is reached, the gases do not remain long enough in the afterburning zone because it is not large enough in most cases. For dust cleaning of these gases centrifugal separators in form of simple cyclones or multicyclones are used exclusively. These collectors have a low collection efficiency for fine dust. The incomplete combustion plus the unsatisfactory dust removal has in many cases led to an abandoning of incineration in favor of dumping. The problem could be solved by installation of more expensive equipment such as electrostatic precipitators or by the joint operation of a large incinerator by several medium-size0 enterprizes.

28192 **APTIC NO. 50359**

Mankowski, Edwin

THE DEVELOPMENT OF MOTOR VEHICLE TRAFFIC AND THE PROBLEM OF THE PROTECTION OF THE ATMOSPHERE. *(Rozwoj motoryzacji a problem ochrony atmosfery). Text in Polish. Przemysl Chem., 31(7):425-427, 1972. 5 refs.*

Problems generated by increasing automotive vehicle traffic in terms of carbon monoxide, aldehyde, hydrocarbon, nitrogen oxide, and tetraethyl lead emission control are discussed. Refineries are facing the problem of creating high octane gasolines using no tetraethyl lead while the automobile engine designers are attempting to develop devices for the catalytical conversion of unburned exhaust constituents. Reference is made to the world wide attempts to develop an electric engine which should provide solutions in emission control. The serial production of such engines is limited, however, by the limitations of their performance at this moment.

28193 **APTIC NO. 50010**

Marble, Georges

POLLUTION, AGGRESSION, AND RADIATION PROTECTION. *(Pollution, agression et radioprotection). Text in French. Radioprotection, 7(4):197-205, 1972.*

Problems of radioactive pollution are discussed against the general background of global pollution. Irresponsible accusations directed toward the nuclear industry are refuted. The overwhelming bulk of radioactive pollution originates in volcanic action and nuclear reactions initiated by cosmic rays, as well as in explosion tests. Radioactive pollution from nuclear facilities, including nuclear power plants and operations using radioactive isotopes is practically nonexistent due to the strict safety measures employed. The absorption capacity for radioactive pollutants, expressed in radioactivity per unit of time, is determined as a function of the liminal irradiation dose for critical organs of the organism, individual biological and nutritional factors, ecological transfer factors in the environment-man system, intrinsic factors of the exposed environment, and of the physiocochemical form of the radioactive element. Non-radioactive pollutants such as sulfur dioxide, carbon dioxide, carbon monoxide, nitrogen oxides, 3,4-benzopyrene, and dust are mentioned. Sulfur dioxide, forming sulfuric acid or sulfates in the atmosphere, constitutes an ubiquitous, dangerous pollutant. It is emitted by petroleum refineries, thermal power plants, as well as by industrial and other combustion equipment. Nitrogen oxides, CO, and 3,4-benzopyrene emissions are generated mostly by internal combustion engines.

28194 **APTIC NO. 50232**

Meinel, Aden Baker and Marjorie Pettit Meinel

PHYSICS LOOKS AT SOLAR ENERGY. *Phys. Today, 25(2):44-50, Feb. 1972. 1 ref.*

Recent problems and perspectives of the utilization of solar energy are described. Solar energy can be converted into electricity directly by the absorption of photons in a doped semiconductor such as silicon or cadmium sulfide, and by thermal conversion wherein heat is converted into electrical energy by way of thermionic, thermoelectric, or magnetohydrodynamic devices; by ordinary steam power turbines; or by biological processes by the growing of crops and subsequent power generation by the thermal system. Thermal conversion requires an operating temperature of 500 C for being adequately effective, which can be achieved by collectors with selective interference filters, using liquid sodium, some inorganic fluid, or salt eutectics as thermal fluid. Solar-power farms, for which an efficiency of 30% may be reasonably expected, could generate energy with practically no negative environmental hazards, and waste heat could be used for desalinating sea water. Conversion of solar energy into a chemical fuel, e.g., hydrogen, is also possible, but storage remains a major problem except in liquid form.

28195 **APTIC NO. 50274**

Mellor, A. M., R. D. Anderson, R. A. Altenkirch, and J. H. Tuttle

EMISSIONS FROM AND WITHIN AN ALLISON J-33 COMBUSTOR. (FINAL REPORT). *Purdue Univ., Lafayette, Ind., Combustion Lab., Office of Air Programs Contract 68-04-0001, EPA-R2-097, Rept. CL-72-1, 106p., June 1972. 18 refs.*

NTIS: PB 212844

Because of the possible widespread use of gas turbines in automobiles and the imminence of Federal emission standards for aircraft, gas turbine combustion and emission characteristics were investigated. A gas turbine combustion facility consisting of a J-33 combustor burning liquid propane was designed and constructed to obtain fundamental experimental information. Gas temperature, carbon monoxide, and nitric oxide concentrations were determined as a function of axial and radial position inside an Allison J-33 combustor. The isolated effects of combustor pressure, overall equivalence ratio, and air flow rate of CO and NO concentrations at various radial positions were investigated. Unheated combustor inlet air was used for these studies; a few preliminary experiments were made using heated air. Gas sampling and analyzing equipment is described. The effect of a nitrogen dioxide converter added to the NO detector system so that NO2 could be measured is mentioned. (Author abstract modified)

28196 **APTIC NO. 50363**

Molenda, Jacek

TECHNOLOGICAL PROGRESS IN THE PROCESSES OF HYDROGEN SULFIDE AND CARBON DIOXIDE REMOVAL FROM NATURAL GAS BY MEANS OF ABSORPTION. *(Postep technologiczny w procesach absorpcyjnego oczyszczania gazu ziemnego z siarkowodoru i dwutlenku wegla). Text in Polish. Gaz, Woda Tech. Sanit. (Warsaw), 46(11):363-368, 1972. 8 refs.*

Removal of hydrogen sulfide and carbon dioxide from natural gas for conditioning and transportation purposes can be performed by dry and wet procedures. Dry procedures involve the adsorption of these constituents on activated charcoal or metal oxide powders and are applicable to gases with H2S concentrations below 12 g/cu m. The wet methods are based on the absorption of H2S and CO2 by recyclable liquids and are applicable to natural gases containing 20 to 40 g/cu m of H2S and CO2. They include the ethanolamine procedure providing maximum yields at 30 to 50 C with acqueous ethanolamine regeneration at 110 C, the diglycolamine method, referred to as the Ekonamin process, and the absorption procedures using alkaline salt solutions. The latter involve potassium carbonate of the Giammarco-Vetrocoke process using K2CO3 with additions of trivalent arsenic compounds. But the procedure considered to be most popular is the Sulfinol method involving a combination of a physical absorbent (cyclotetramethylene sulfone or sulfonal) and a chemically reacting absorbent (diisopropanolamine). The sulfinol procedure is most appropriate for gases with an approximate H2S/CO2 ratio of 1:1, but works well for gases carrying mercaptans and carbon disulfide as well. The corrosivity of this procedure is several times lower than that of the other procedures, while achieving complete removal of the contaminants at low operating costs.

28197 **APTIC NO. 50302**

Ross, F. F.

SULFUR DIOXIDE (1970-1972). *(Anhydride sulfureux (1970-1972). Text in French. Tribune CEBEDEAU (Centre. Belge Etude Doc. Eaux), 25(348):456-460, Nov. 1972. 20 refs.*

General problems and hazards of sulfur dioxide as seen currently are reviewed. While SO2 alone is not especially harmful for man and animals, combined with soot and other unburned residues, it may exacerbate bronchitis. Plants in general are most sensitive to SO2. In Great Britain, where the specific SO2 emission is 12 t/sq km, no restrictions on the emission seem to be necessary. While SO2 emissions from domestic heating in urban areas can be effectively abated by the use of low-sulfur fuel and of other, non-polluting forms of energy, large-capacity emission sources necessitate high stacks for maximum dilution. The SO2 emissions from such high stacks have little influence on the ground-level concentrations, and secure uniform distribution of SO2 over large areas. It is doubtful if SO2 emitted in such a manner can be accused of being harmful at all. Farmlands and forests require 0.5-3 t/sq km/yr of sulfur, of which anthropogenic SO2, washed out by precipitation, is able to supply 1-2 t/sq km, corresponding to an average concentration of 20 micrograms/cu m in summer. The soil acidification caused by fertilizers and SO2 can be prevented by liming. As shown by examples from Sweden, dust separation and increased use of hydrocarbons for coal and wood may result in soil acidification due to SO2 not being adsorbed by alkaline ashes and dust. Apart from the reduction of the coal sulfur content to 3%, the use of high stacks represents the only method of practical interest for abating SO2 concentrations.

28198 **APTIC NO. 50292**

Sansom, Robert L.

REDUCING AUTO EMISSIONS: SOME RELEVANT FACTS. *Preprint, 14p., 1972. (Presented at the North American Conference on Motor Vehicle Emission Control, Albuquerque, N. Mex., Nov. 13, 1972.)*

Facts on reducing auto emissions are presented. The automobile is the single most important source of air pollutants. It was estimated that in 1970, gasoline powered motor vehicles contributed 50% of the hydrocarbons, 70% of the carbon monoxide, and 30% of the nitrogen oxides emitted into the air. In some cities motor vehicle emissions were in the 90% range. Criticisms of the definition of the pollution problem, goals for reducing emissions, and automotive emission standards are reviewed. Critics mention that: damage from non-automotive pollutants may be greater than the potential for damage from automotive pollutants; that carbon monoxide blood levels of people in major cities are below the level at which there is any health effect; and that natural sources emit more pollutants than automobiles. The limits to growth thesis is considered in relation to the development of technology which would be able to implement the new emission standards. Evidence available to control agencies indicates the technology to meet 1975 standards is present and can be utilized at a reasonable cost to the consumer.

28199 **APTIC NO. 50383**

Signorini, Lido

STUDY OF A GENERAL METHOD FOR EQUILIBRIUM COMPOSITION CALCULATION OF COMBUSTION GASES. *(Studio di un metodo generale per il calcolo della composizione di equilibrio di gas di combustione). Text in Italian. Termotechnica (Milan), 26(1):13-19, 1972. 21 refs.*

A generalized thermodynamic approach for the determination of the equilibrium composition of gases derived from the combustion of naphtha under different excess air conditions is presented. From the thermodynamics point of view, the equilibrium configuration is characterized by the free energy function, referred to as the Gibbs function, assuming its minimum value is compatible with the given system. The minimum Gibbs function for known pressure and temperature conditions can be determined by using the Lagrange Multipliers, by means of linear programming, or by means of the step descendents method. Flow-charts and graphs describing the variation of sulfur, hydrogen sulfide, oxygen, sulfur dioxide and trioxide, nitrogen, ammonia, nitrogen oxides, and carbon oxides, under certain partial pressure and temperature conditions with 1% excess air are included. The computer time required for the above computations amounts to 20 sec, to provide five-digit data. A numbrical example is presented.

28200 **APTIC NO. 50263**

Verrelli, Leonard D.

EXHAUST EMISSION ANALYSIS OF TWO WANKEL-POWERED CARS FURNISHED BY THE U. S. ARMY TANK/AUTOMOTIVE COMMAND. *Office of Air Programs, Power Systems Section, Rept. 73-10, APTD-1385, 4p., Sept. 1972.*

The exhaust emission characteristics of two Wankel-powered passenger cars were studied to determine the effect of the engine design on driveability, fuel economy, durability, and emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. None of the emission levels approached the 1975-1976 proposed standards, but relatively low levels of NOx were achieved.

1971

28201 **APTIC NO. 50287**

Los Angeles County Air Pollution Control District, Calif.

STUDY OF JET AIRCRAFT EMISSIONS AND AIR QUALITY IN THE VICINITY OF THE LOS ANGELES INTERNATIONAL AIRPORT. *Air Pollution Control Office Contract CPA-22-69-137, Rept. APTD-0662, 189p., April 1971.*

NTIS: PB 198699

The impact of jet aircraft operations on the air environment in the vicinity of the Los Angeles International Airport was investigated from June 30, 1969 to Nov. 18, 1970. Jet flights accounted for 53% of the pollution, 72% of the hydrocarbons, and 90% of the particulates. Ground operations accounted for 42% of the total air pollutants and 55% of the carbon monoxide. Total emissions in the airport area were 122 t/day; aircraft using the airport emitted an additional 45 t/day below 3500 ft but outside the airport boundary. Based on flight time surveys and JT4A and JT9D engine test data, 70% of the flight time to and from 3500 ft altitude was in the idle and taxi mode which accounted for 60-70% of the total engine emissions. Although particulate emissions from the JT4A were conspicuous during final approach and take-off, abut 60% of the particulate emissions below 3500 ft occurred during taxi and idle modes after arrival touchdown and before the take-off run. The JT8D engine emitted total pollutants at a rate about twice that of any of the other six models tested. Its 35% portion of the engine flights at the Los Angeles Airport accounted for 55% of the total emissions from all jet flights at the airport. Increased soiling occurred in the airport area. Monthly average CO values in downtown L. A. (4-6 ppm) and Lennox (6-7 ppm) were within the range of the ambient concentrations at the airport (2-18 ppm). The CO levels in areas near the airport averaged 4-11 ppm; CO levels at paired inside-outside sampling locations were generally higher at the inside station. The highest monthly average ground level CO concentration of 18 ppm was in an area close to heavy automobile traffic. Mobile sampling near the airport showed increasing particulate values upwind of the airport to a maximum immediately downwind of the airport. The CO values were more randomly distributed and tended to be higher along major traffic routes. During runway operations, CO concentrations in the aircraft cabin were comparable to airport background values and significantly lower than levels to which the air traveler is exposed during his stay at the air terminal prior to taxiing onto the runway.

28202 **APTIC NO. 58244**

Ashby, H. Anthony

EXHAUST EMISSIONS FROM A 25-PASSENGER INTERNAL COMBUSTION ENGINE POWERED GASOLINE FUELED BUS. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-7, APTD-1391, 12p., Oct. 1971.*

The exhaust emission characteristics and operating conditions of a 25-passenger internal combustion engine bus were studied to establish baseline emission values. The emission levels tested, according to bus route, engine operating cycle, and testing procedures, ranged within 22-26 g/mi of hydrocarbons, 91-130 g/mi for carbon monoxide, 962-1145 g/mi for carbon dioxide, and 10-12 g/mi for nitrogen oxides.

28203 **APTIC NO. 58258**

Ashby, H. Anthony

EMISSIONS FROM THE METHANOL FUELED STANFORD UNIVERSITY GREMLIN. *Environmental Protection Agency, Office of Air Programs, Rept. 72-4, APTD-1388, 9p., Aug. 1971.*

The exhaust emission characteristics of a methanol-fueled passenger car were studied with respect to emission levels of hydrocarbons, carbon monoxide, and nitrogen oxides. Under the conditions of the 1972 Federal test procedures, the mass emissions came very close to meeting the 1975-1976 Federal standards. The most noticeable change was in the reduction of NOx when changing from gasoline to methanol. Additional test data on hydrocarbon emissions were collected in catalyst hot and cold start tests. Few aldehydes other than formaldehyde were present in appreciable quantities. The largest effect of the catalyst was to reduce the methanol 90% for cold starts and 96% for hot starts. The catalyst also reduced CO about 70% but had no effect on NOx; aldehydes were reduced 75-80%. The largest differences between cold and hot starts were in hydrocarbons and CO which decreased 80-90%; aldehydes were only reduced 30%, and CO2 and NOx about 10%.

28204 **APTIC NO. 58269**

Ashby, H. Anthony

EMISSIONS FROM THE WORCESTER POLYTECHNICAL INSTITUTE (WPI) HYBRID. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-14, APTD-1398, 4p., Oct. 1971.*

The exhaust emission characteristics of an electric hybrid car were studied with respect to emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The hybrid was powered by batteries and equipped with an internal combustion engine for battery recharging and various emission controls, including air injection into the exhaust manifolds, catalytic reactors, and exhaust gas recirculation. The fuel was a lead-free gasoline. The mass emissions were relatively high, with maximum emissions as determined by the 1972 Federal testing procedures at 5.84 g/mi hydrocarbons, 20.39 g/mi CO, 1763.8 g/mi CO2, and 11.44 g/mi NOx.

28205 **APTIC NO. 58243**

Fleming, R. D., W. F. Marshall, and J. R. Allsup

FUEL ADDITIVES AND AUTOMOBILE EXHAUST EMISSIONS. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center, BM-TPR-40, 16p., Aug. 1971. 7 refs.*

NTIS: PB 203894

The influence of fuel additives on automobile exhaust emissions was studied using engines currently found in the U. S. vehicle population. Four multifunctional additives (alkylaminoalkyl phosphate, polybutene amine, nickel-alkyl-phosphate, and cresyl-diphenyl-phosphate) and tetraethyl lead antiknock additive were tested to determine both the direct effect of the additive per se on exhaust emissions (carbon monoxide, hydrocarbons, nitrogen oxides, and aldehydes) and the influence of long-term additive effects on emissions with mileage accumulation. No significant direct or intermediate effects on exhaust emissions for any additives were found. In subsequent experimental work with the additives, the detergent-dispersant additives had little influence on emissions when used in conjunction with high-quality oil and motor fuel. The lead antiknock additive increased exhaust hydrocarbons approximately 12 to 17% during a 4000-mile accumulation period using a base fuel containing 2 ml of tetraethyl lead/gal. An unleaded fuel was used during a similar accumulation period with no significant increase of hydrocarbons with mileage. (Author abstract modified)

28206 **APTIC NO. 58237**

Herring, William O.

SECONDARY ZINC INDUSTRY EMISSION CONTROL PROBLEM DEFINITION STUDY. PART 1 - TECHNICAL STUDY. (FINAL REPORT). *Environmental Protection Agency, Durham, N. C., Air Pollution Control Office and National Assoc. of Secondary Material Industries, New York, Rept. APTD-0706, 150p., May 1971. 16 refs.*

NTIS: PB 201739

Secondary zinc plants were tested for particulate and gaseous emissions. The principal processes of the industry are sweating and distillation applied to recovery of metallic zinc. Emissions from the sweat process occur at very low rates where the processed zinc scrap contains only small amounts of impurities. However, very significant emissions of particulate and carbonaceous substances and of particulate zinc oxide and zinc chloride may occur when there are substantial impurities in the scrap. The emission factors for zinc sweat processes rangyfrom 0-32 lbs particulates/ton scrap processed. The emitted particulates may be composed of 0-34% ZnCl2, 40-100% ZnO, and a small percentage of carbonaceous substances. Smaller amounts of other metal oxides, metal chlorides, and ammonium chloride may also be emitted. Emissions from distillation contain ZnO; these emissions occur at significant rates, but are satisfactorily controlled using baghouses. Emission control systems include jet impact scrubbers, venturi scrubbers, packed tower scrubbers, baghouses, scrubbers with an impingement plate, electrostatic precipitators, and afterburners. Limitations of these gas cleaning devices include corrosion of bag filter materials by chlorides, blinding of dry fabric filters by adhering carbonaceous particles and deliquescent ZnCl2, blinding of irrigated fabric filters by adhering carbonaceous particles, abrasive wear of glass bag filter materials during cleaning, limited temperature resistance of organic fabrics, and tar-like deposits and ignition hazards associated with carbonaceous emissions. Emission characteristics of the various furnace types, particle size, particulate composition, emission rates, effluent flow rates and temperatures, and effluent gas composition are also discussed.

28207 **APTIC NO. 58229**

Hottel, H. C.

THE FUTURE OF SYNTHETIC PIPELINE-GAS TECHNOLOGY. *Preprint, American Assoc. for the Ad-*

vancement of Science, Washington, D. C., 13p., 1971. (Presented at the American Association for the Advancement of Science, Annual Meeting, 138th, Philadelphia, Pa., Dec. 1971.)

Although our total energy requirements have doubled every 22 years for the past 40 years, and although their doubling-time has held steady at 15.5 years for the last 9 years, the nation s use of natural gas has for the past 40 years doubled every 11 years. While supplies of natural gas are being found with increasing difficulty, there are coal supplies that will last for hundreds of years. Thus, a half-dozen of the nation s research teams are hard at work learning how to make clean pipeline quality gas -- synthetic natural gas -- from coal without fouling the air and water. To date, methane or synthetic gas is made by the reaction of steam with carbon, followed sometimes by a catalyzed shift to a more favorable higher ratio of hydrogen to carbon monoxide, and followed in turn by such heat-liberating reactions as 3H2 plus CO to yield CH4 plus H2O. Unfortunately, the reaction is energy-absorbing, and the gas leaving the gasifier system is not rich enough or clean enough. It must be freed of sulfur compounds and carbon dioxide, and then methanated catalytically. Flowsheets of several process combinations are presented; the Hygas-Electrothermal process which is at the pilot plant stage is discussed. Costs are high, but the need to develop synthetic gas technology is great.

28208 **APTIC NO. 50223**

Klanner, Wilfried

EXPERIMENTAL AND THEORETICAL STUDY OF THE FUEL FILM EVAPORATION IN DIESEL ENGINES. *(Experimentelle und theoretische Untersuchung der Kraftstoffilmverdampfung im Dieselmotor). Text in German. Technische Univ., Munich (West Germany), Fakultaet fuer Maschinenwesen und Elektrotechnik, Thesis (Ph.D.), Munich, West Germany, 1971, 194p. 48 refs.*

For further clarification of the mixture formation processes on the combustion chamber wall of diesel engines, a capacitive layer density measurement method was developed. With it the local and temporal characteristics of the fuel quantity on the combustion chamber wall could be determined for the first time. First the theory of this measurement method is outlined and guidelines for the design, construction, and calibration of the indicator are set up. The first test of the indicator was carried out in an experimental chamber which permitted the study of the evaporation of the fuel film at engine gas pressures and wall temperatures in a calm atmosphere heated only from the wall. The lifetime of a film decreases with increasing wall temperature without forming a lifetime minimum. The determined evaporation speeds were about 10% of the initial quantity/sec. This corresponds to the 1/1000-fold of the values to be expected in the engine. Furthermore, the evaporation curves (the characteristic of the film thickness as function of time) of a pure unmixed hydrocarbon were assumed to be linear form after a certain warm-up period; those of a hydrocarbon mixture a degressive form. On an experimental engine the wall-application of the fuel, dispersion and evaporation was studied. The experiments with diesel oil injection without combustion yielded that the films on the wall get several hundredth of a millimeter thick at the most. For evaporation velocity values around 1.25%/k of the totally injected fuel quantity at full load were found. The maximum fuel quantity on the wall is not influenced by the combustion, the lifetime of the film is reduced to one-half. Wall temperature fuel/air ratio, and fuel injection timing are the most important parameters.

28209 **APTIC NO. 50234**

Narayan, Raghu Subramani

IDENTIFICATION AND CONTROL OF CATTLE FEEDLOT ODORS. *Texas Technical Univ., Lubbock, Chemical Engineering, Dept., Thesis (M.S.), 1971, 27p., 29 refs.*

A research program to determine the nature of gases present in the atmosphere around a beef cattle feedlot was carried out in three phases: tentative identification by the selective solubility method of the functional classes of organic compounds in manure off-gases; identification of the compounds within each class by gas chromatographic analysis; and identification of compounds evolved in enclosed feedlot operations by simulation in an environmental chamber. Only four groups of compounds were determined to be present to any significant extent in manure off-gases: alcohols, secondary amines, carbonyls, and sulfur compounds. Prior to gas chromatographic analysis, these groups were concentrated by selective absorption and the concentrated gas samples were liberated by distillation or pH reversal. In the simulation experiments, a 350-pound steer was housed in a 12 ft by 12 ft chamber managed under three different schemes for 1 wk each: clean and wash the chamber every day; shovel out waste daily, no washing; no cleaning or shoveling. During the first scheme only a few odiferous contaminants were generated; of these the most obnoxious were acetaldehyde and iso-butraldehyde. When daily washing was discontinued, indole and skatole were detected in the chamber. The number of compounds present increased threefold during the third scheme. Formic, acetic, and propionic acid esters were detected in air samples, the mixture of these gases giving an extremely offensive odor. Control of feedlot odors by a feed ration of humic acid or ozone oxidation of manure is proposed.

28210 **APTIC NO. 50256**

Thomson, John C.

A REPORT ON THE EMISSION PERFORMANCE OF THE FORD STRATIFIED CHARGE ENGINE USING THE 1975 TEST PROCEDURE. *Environmental Protection Agency, Office of Air Programs, Rept. 72-2, APTD-1386, 5p., Aug. 1971.*

The exhaust emission characteristics of a low-emission stratified charge combustion engine further modified with air-fuel ratio controls, exhaust gas recirculation, a catalytic afterburner, and a thermal reactor were studied on a truck to determine the effect of these modifications on driveability, fuel economy, and emission levels of hydrocarbons, carbon monoxide, and nitrogen oxides. The emission reductions for the modified system were significant, with emission levels approaching the 1976 standards; driveability and fuel economy were comparable to those of the uncontrolled vehicle.

1968

28211 **APTIC NO. 50242**

Wolfson, M. R., M. S. Pakulak, C. E. Arthur, T. E. Doyel, and R. J. Morey

TOXICITY STUDY OF MK 50 MOD O ROCKET MOTOR EXHAUST. *Naval Weapons Center, China Lake, Calif., Propulsion Development Dept., 14p., Aug. 1968. 4 refs. ORD Task 008-084-001/200-1/127-00-01, Rept. NWC-TP-4638.*

NTIS, DDC: AD 842118

A fluorocarbon base propellant, N-34, is used in the Mk 50 Mod O rocket. Toxic gases, hydrogen chloride, and hydrogen fluoride are exhausted during combustion. Exhaust clouds were sampled during rocket firings and to determine HCl and HF concentrations in the atmosphere in the vicinity of the launcher during firing. Topside HCl concentration was above the threshold limit value but below the tolerable limit for short duration exposures. Topside HF concentration at the launcher was above both the threshold and short duration limits; and 60 ft from the launcher, was above the threshold but below the tolerable limit for short exposures. Both the HCl and HF concentrations in the magazine were below their respective threshold limit values for extended and repeated exposures. (Author abstract modified)

CONTROL METHODS

1973

28212 **APTIC NO. 50214**

THE REMOVAL OF SULFUR DIOXIDE FROM WASTE GASES. *(Beseitigung von Schwefeldioxid aus Abgasen). Text in German. Sanit. Heizungstech., 38(3):249-250, 1973.*

For the removal of sulfur dioxide from the off-gas of three steam boilers in a Stockholm hospital an SO2 scrubber is used. The flue gas passes the fluid bath in the scrubber at high speed and carries scrubbing fluid along to a second stage. In the actual scrubbing zone, high turbulence prevails dispersing the scrubbing fluid into fine droplets. Behind the scrubbing zone thy fluid is separated from the gas in a droplet separator. A ring of guide vanes in the droplet separator imparts a rotating movement on the gas flow, so that the water droplets are thrown to the wall. This process is repeated on a second stage. As a scrubbing, fluid water and lime is used. Other chemicals such as sodium hydroxide, soda, or ammonia can be used too. The scrubber has a 98% efficiency. The SO2 concentration is reduced from 120 kg/hr to 3 kg/hr, the dust concentration is also considerably reduced.

28213 **APTIC NO. 50221**

NOTES ON CATALYTIC AFTERBURNING. *(Hinweise zur katalytischen Nachverbrennung). Text in German. Wasser Luft Betrieb, 17(2):54-56, 1973.*

The method of catalytic afterburning for waste gas cleaning is reviewed. It can be applied for the removal of pollutants which possess an affinity to oxygen. The catalysts used mostly are solid and comprise an active substance and a carrier material. For both components metals as well as oxides or oxide mixtures can be used. The speed of the catalytic reaction is influenced by such factors as pressure, temperature, flow velocity, and structure of the catalyst. A list of the reaction temperatures for several organic substances is provided. For an efficient reaction it is important that the concentration of the gaseous pollutant to be removed is small and that all dust has been removed prior to catalytic afterburning. The waste gases are warmed to the temperature required for the catalytic oxidation in a heat exchanger. If this is not sufficient an oil burner is used for preheating. The additional fuel consumption necessary for preheating various waste gases is listed in a second table. In the case of the hydrocarbon-containing waste gases, up to 0.1 kg fuel oil per 1000 cu m/hr waste gas is necessary.

28214 **APTIC NO. 50279**

Office of Air and Water Programs, Div. of Emission Control Technology

AUTOMOBILE EMISSION CONTROL - THE STATE OF THE ART AS OF DECEMBER 1972. *Rept. APTD-1489, 238p., Feb. 1973. 2 refs.*

NTIS: PB 217116

Information and data supplied by 20 different automobile manufacturers and other organizations involved in the development of emission control technology on emission control systems planned for use in the 1975-1976 model years, results of durability tests, significant technical problem areas, and the development status of the industry are summarized and evaluated. The various control systems included the CVCC (Compound Vortex Controlled Combustion) engine, the rotary engine-thermal reactor combination, the Diesel engine, intake and carburetor system modifications, spark timing, combustion chamber and exhaust port modifications, exhaust gas recirculation systems, air injection systems, catalytic oxidation, and the use of non leaded fuels. Under present EPA criteria, only one manufacturer was predicted to even have a chance to comply with all the emission regulations for 1975; with modifications, 85% of the current U. S. market would probably be able to certify vehicles. The major industry-wide technical problem is in the area of nitrogen oxides catalysts. Catalytic control of hydrocarbon and carbon monoxide emissions is fairly established, but effective and consistent control depends on the careful maintenance and operation of the vehicles.

28215 **APTIC NO. 50354**

The Fuel Society of Japan, Osaka Branch and Japan Boiler Assoc., Osaka

A PANEL DISCUSSION ON PLANNING, DESIGNING, AND UTILIZING THE STACK GAS DESULFURIZATION SYSTEM. *(Haien datsuryu sochi no keikaku to sekkei, riyo ni kansuru zandankai kiroku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 40(4):366-394, April 1973.*

The conditions for a desulfurization apparatus against high temperature and strong acid, heat recovery for the combustion of odorous substances, prevention of nitrogen oxides at the sources of emission, toxicity of waste gypsum, the advantages of sulfur recovery from sulfur dioxide, application of desulfurization by hydrogen reduction, development of gypsum utilization, NOx and denitrogenation, the direct soda lime method, high efficiency of dust removal by dilute sulfuric acid washing method, the oxidation-absorption method for high efficiency desulfurization, and the treatment of a large quantity of low concentration SO2 by activated carbon are discussed.

28216 **APTIC NO. 50215**

Ableitner, Erich, Hans Peter Lenz, and Kurt Oblaender

THE NEW MERCEDES BENZ TWO-CAMSHAFT SERIES ENGINES. *(Die neuen Mercedes-Benz Zwei-Nockenwellen-Reihenmotoren). Text in German. Automobiltech. Z. (Stuttgart), 75(3):76-84, 1973. 14 refs.*

The new 2.8 l series of internal combustion engines by Daimler Benz have been equipped with two camshafts, a cross flow cylinder head, and an ideally shaped combustion chamber. In order to reduce the pollutants in the waste gas to the required values an adjustment device for adequate ignition timing was installed. As a carburetor a double register carburetor with equal-pressure secondary stages was selected for the new series because it permits exact dosage at partial load, lowest possible throttling in the upper full load range, and good mixture preparation in the lower full-load range. The carburetor is of compact design and requires little maintenance. With the new design a high-power engine was obtained despite using low-leaded fuels. A description and illustration of all important engine parts is given.

28217 **APTIC NO. 50383**

Bakay, A.

THE COOLING TOWER WITHOUT VAPOR PLUME. ENVIRONMENTAL PROTECTION THROUGH AIR COOLED CONDENSATION. *(Der Kuehlturm ohne Dampfschwaden Umweltschutz durch luftgekuehlte Kondensationsanlagen). Text in German. Brennstoff-Waerme-Kraft, 25(2):52-54, Feb. 1973. 5 refs.*

For large power plants with capacities between 1000 and 2000 MW dry cooling towers gain increasing importance because wet cooling towers emit too much water vapor. A 2400 MW power plant discharges at least 5000 t/hr of water vapor. This quantity distributed over an area of 100 sq km corresponds to an annual precipitation of about 300 mm. The natural precipitation in Central Europe averages between 600 to 700 mm/yr. Dry cooling processes by indirect air cooling avoid this problem entirely. Dry cooling processes by indirect air cooling avoid this problem entirely. Dry cooling towers are larger and costlier, although additional costs for the consumer would only amount to 2 to 3%. The interior of dry cooling towers is entirely free of installations which provides the possibility of accommodating the power plant itself in the tower. This would reduce the space demand. Ten years of experience with the operation of dry cooling towers in two power plants have been positive, so this method can be recommended to eliminate the vapor emission from wet cooling towers.

28218 **APTIC NO. 50060**

Bauer, Hans-Dieter and Erich Bruckmann

DEGREE OF EFFICIENCY OF DUST COLLECTORS - A CRITICAL STUDY WITH SPECIAL CONCERN OF THE GRAIN DISTRIBUTION AND THE CONCENTRATION OF THE DUST. *(Wirkungsgrad von Entstaubern-eine kritische Betrachtung unter besonderer Beruecksichtigung der Kornverteilung und der Konzentration des Staubes). Text in German. Staub, Reinhaltung Luft, 33(3):126-129, March 1973. 7 refs.*

In a uniform dust producing process, the distribution of dust particles can undergo considerable changes according to the dust concentration occurring in the untreated air. As a result of the decreasing distance between particles due to increasing dust concentration, the electrostatic adhesion forces can increase under specific charging conditions and cause the formation of agglomerations and, consequently, the displacement of the particle spectrum to the coarse dust side. This phenomenon has a direct effect on the efficiency of the electrostatic dust separator, so that lower penetrations are to be expected. Since this displacement of the particle spectrum cannot be seen during sedimentation analysis, the amount of fine dust is usually given as too high. As a result, there is a risk that the degrees of fractional dust removal may be set too high, so that erroneous planning cannot be excluded.

28219 **APTIC NO. 50136**

Bernert, Juergen

LEGISLATION AND ENGINEERING OF THE CLEAN AIR MAINTENANCE IN THE TEXTILE INDUSTRY. *(Recht und Technik der Luftreinhaltung in der Textilindustrie). Text in German. Melliand Textilber., 54(3):295-300, March 1973. 19 refs.*

Legislation, emission control, and measurement techniques for the textile industry are reviewed. Equipment such as used in textile refining and other operations which emit more than 10 kg of combustible substances hourly are required to be equipped with emission control devices able to limit the carbon content of the combustible organic matter in undiluted waste gas to 300 mg/N cu m. Condensation, absorption, adsorption on activated carbon, and thermal or catalytic afterburning are the processes suitable for abating organic emissions from textile refining equipment. The condensation process is used mostly for emissions from closed apparatuses, and it requires high initial pollutant concentration, low volatility, and adequate pressure of the waste gases. It is used for the separation of hydrocarbons and organochlorine compounds from inert gases, of easily condensable solvents such as perchloroethylene and dimethylformamide, and of e.g., methylene chloride in a preliminary stage prior to adsorption. Scrubbing is practically applicable in all cases where Henry's law is obeyed. Adsorption on activated carbon is suitable for the removal of vapors in a wide concentration range, and simple steam regeneration of the spent carbon is possible. Thermal afterburning of waste gases requires a temperature range of 800-1000 C for high efficiency, while catalytic afterburning is usually conducted in a temperature range of 450-500 C. A standard procedure for the determination of the total combustible organic content of waste gases requires oxidation of the quantitatively adsorbed organic matter in pure oxygen stream into carbon dioxide and water vapor on platinum contact. Sulfur oxides and halogen compounds formed during incineration are adsorbed. The CO2 released by desorption is absorbed by barium hydroxide solution, and titrated with 0.1 n oxalic acid.

28220 **APTIC NO. 50052**

Borho, Klaus

AGGLOMERATION AND WALL DEPOSITION FROM GAS/SOLID FLOW OWING TO ELECTROSTATIC CHARGING. *(Agglomeration und Wandansatz bei Gas/Feststoffstroemungen aufgrund elektrostatischer Aufladungen). Text in German. Chem Ing.-Tech., 45(6):387-391, 1973. 12 refs. (Presented at the Jahrestreffen der Verpahrens-Ingenieure, Cologne, West Germany, Oct. 5, 1972.)*

Agglomeration and wall deposition lead to changes in the concentration of dust and in the particle size distribution in dust-containing gases flowing through pipes. A high bipolar charge of the dust very strongly accelerates agglomeration, in full accord with known coagulation models. The wall deposition is 10-fold higher than that expected from a theoretical treatment paying no attention to electrostatic charging. An estimate shows that the average charge of the dust in the main parameter.

28221 **APTIC NO. 50137**

Bowen, I. G.

MUNICIPAL REFUSE INCINERATORS AND ENVIRONMENTAL FACTORS. *Filtration Separation (Purley), 10(1):75-76, 78, 80, 80-84, Jan.- Feb. 1973. 9 refs. (Presented at the Filtration Society Symposium on Prevention of Air Pollution from Incineration, Jan. 18, 1972, Manchester, England.)*

Environmental problems involved in municipal refuse incinerators are described. From an environmental standpoint, incineration answers most of the problems set by tipping except for the release of acid gases to the atmosphere. Modern straight incinerators accepting total refuse include refuse storage and handling facilities, continuously fed, or self-feeding grates burning the charge in residence times between 60 min, mechanical residue collector at the end of the grates and water-spray gas coolers to allow exit temperatures of 500-600 C. The modern high standards for gas cleaning can be met by gas scrubbers, dry multicyclones, and electrostatic precipitators. Bag filters are usually not suitable for the purpose of incinerator flue gas cleaning. Gas scrubbers are low-priced for comparatively high efficiency of up to 95%, and they perform the double task of cooling and cleaning waste gases. Waste water and sludge constitute secondary disposal problems. Multicyclones, excelling by their simplicity and relative inexpensiveness, reach efficiencies of 90-92%. Apart from cost, electrostatic precipitators possess most of the advantages for application to incinerators, and are used extensively especially in large incinerator plants. Legal requirements including dust emission standards for coal-fired boilers and refuse-fired boilers are mentioned.

28222 **APTIC NO. 50031**

Caspers, John and Andrei Rhoe

DESULFURIZATION OF FUEL OILS. *(Schwefelreduzierung in Heizoelen). Text in German. Erdoel Kohle (Hamburg), 26(2):65-70, Feb. 1973. 24 refs. (Presented at the Oesterreichische Gesellschaft fuer Erdoelwissenschaften, Nuernberg, West Germany, Oct. 4, 1972.)*

Fuel oil can be desulfurized by direct and indirect methods. With the direct method the entire residual substance from atmospheric distillation is desulfurized including the asphalt fraction. With the indirect method the oil that is desulfurized contains only small fractions of asphaltenes. The advantage of the indirect desulfurization method is the long life-time of the catalysts, the disadvantage is the low degree of desulfurization that can be achieved. The total sulfur dioxide emission for West Germany 1980 is estimated to reach 5.4 million tons, this is 20% more than in 1970. The average sulfur concentration of fuel oil for 1980 is estimated to amount to 2.6 wt%. A reduction of the sulfur concentration of fuel oil to 0.5 wt% would reduce the total SO2 emission to 3.2 million t/yr, approximately 40% of the estimated quantity. One million dollars would be needed to reach this level. The total operating costs for fuel oil desulfurization including the capital costs are estimated to $300-400 million/yr for 1% S in the fuel oil and to $400-500 million dollars for 0.5% S in the fuel oil.

28223 **APTIC NO. 50294**

Dolmans, D. P.

THERMAL INCINERATION OF CERTAIN ATMOSPHERIC POLLUTANTS BY CONTACT WITH A GAS FLAME. *(Incineration thermique de certains polluants atmospheriques par contact avec une flame de gaz). Text in French. Tech. Moderne, 65(1):51-52, Jan. 1973.*

Direct thermal incineration of combustible waste gases in a gas flame is described. Such thermal incinerators, possibly equipped with heat recovery unit, are suitable for the incineration of waste and vent gases from surface coating, printing, textile, glass-fiber manufacturing, and foundry plants, as well as from coffee roasting and meat smoking installations. Oxygen supply to the combustion chamber is not necessary when the waste gas to be decontaminated contains enough oxygen for incineration. The pollutants to be destroyed require sufficient time at adequately high temperature for their quantitative oxidation, which is facilitated by turbulence in the flame area. The inlet flow rate of the waste gas should reach a minimum critical value, and also a certain pressure loss and combustion chamber length are necessary. The respective temperature ranges necessary for odor control, hydrocarbon oxidation, and carbon monoxide oxidation are 500-600 C, 500-650 C, and 650-750 C. Modern incinerators are capable of reaching efficiencies of up to 90-99%.

28224 **APTIC NO. 50070**

El-Rifai, M. A., M. A. Saleh, and H. A. Youssef

STEAM REGENERATION OF A SOLVENTS ADSORBER. *(Chem. Engr. (London), no. 269:36-38, Jan. 1973. 6 refs.*

An approximate model for the transient heat transfer in the bed of a fixed-bed charcoal adsorber for solvents and for determining the optimum time of steam admission for most economic recovery of the adsorbate was developed on the basis of experimental data obtained in the course of steam elution of the charcoal adsorbent. The adsorption tank used for adsorbing ether and alcohol vapors evolved in a monobase propellant plant contains activated cylindrical charcoal particles resting on a bed of pebbles. Unsteady state measurements of the temperature at three levels within the charcoal bed indicated that the temperature dynamics in the course of purging may be approximated by a two-parameter transfer function in which the distance velocity lag and the transfer lag are dependent of depth. The measurements of the transient composition of the eluate effluent enabeled the application of the various criteria recommended for estimation of the optimal purging-out time of the adsorber. This was between 55 to 60 min corresponding to an average bed temperature of 106 C, a batch composition of 27%, and a recovery efficiency of 96%.

28225 **APTIC NO. 50088**

Emi, Jun, Kikuo Okuyama, and Tamio Aoki

THE EFFECT OF ADJACENT FIBERS ON FIBER-PACKED LAYER FILTRATION. *(Seni jutenso roka ni okeru rinsetsu seni no eikyo). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 188-190, 1973. 10 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper B201.)*

Aerosol filtration efficiency was estimated based on the theory of the isolated cylinder; the effect of the degree of filling was estimated experimentally. The interfiber interference on the single fiber collection efficiency varies with different collection mechanisms. The inertia interruption efficiency of particles is discussed. In comparison with a glass fiber layer having a high filling degree and other filters, the change in the efficiency with the filling degree was shown quantitatively on the basis of the isolated cylinder efficiency.

28226 **APTIC NO. 50026**

Engels, Lothar-H. and Guenter Willert

CRITERIA AND POSSIBILITIES FOR DRAWING OFF DUST IN INDUSTRIES. *(Kriterien und Moeglichkeiten zur Erfassung des Staubes in Industriebetrieben). Text in German. Staub, Reinhaltung Luft, 33(3):140-141, March 1973. 4 refs.*

Working area dust conditions can be improved by ventilation and dust removal. A sufficient drawing off of noxious substances requires suitably designed removal elements in which the laws governing the flow are taken into consideration. Different removal mechanisms compared. The effect of various cross sections of suction pipes on the drawing off of dust is discussed.

28227 **APTIC NO. 50051**

Enke, Christian G. G.

CORROSION DAMAGES AND THEIR PREVENTION. *(Korrosionsschaeden und ihre Verhuetung). Text in German. Wasser Luft Betrieb, 17(3):82-85, 1973.*

As soon as the combustion takes place in a reducing atmosphere, such as that in an incinerator, hydrogen sulfide is formed if sulfur-containing material is burned. Even in an oxidizing atmosphere corrosion cannot be avoided because sulfur dioxide and sulfur trioxide are formed, the latter mainly depending on excess air. In incinerators an ideal conduction of the combustion process is not feasible because of the varying composition of refuse material. However, through the operation with excess air plus continuous monitoring of the oxygen concentration and the gaseous pollutants such as SO3, hydrogen chloride, and nitrogen oxides, better combustion can be achieved. Corrosion problems occur also in electrostatic precipitators used for the dust collection in industrial off-gases. Such gases frequently contain up to 50 vol% water vapor and sulfur dioxide concentrations of between 0.1 to 8 vol%. The walls of the precipitator can be efficiently protected against this corrosion by avoidance of undercooling. Any protection of the walls of electrostatic precipitators installed behind modern steam generators where the flue gas has a temperature of 145 C remains difficult. In this case corrosion is unavoidable.

28228 **APTIC NO. 50049**

Fahrbach, Joerg

LIFE SPAN OF HIGH QUALITY AEROSOL FILTERS FOR RESPIRATORS - A METHOD FOR ITS RAPID ESTIMATION. *(Die Gebrauchsdauer hochwertiger Schwebstoffilter fuer Atemschutzgeraete - eine Moeglichkeit zu ihrer raschen Abschaetzung). Text in German. Staub, Reinhaltung Luft, 33(3):146-150, March 1973. 13 refs.*

The life span of aerosol filters is determined by the filter construction, the dust which the filter has to retain, and the carrier of the respirator. The pore size distribution of the filter, the specific surface of filter and dust, and the porosity of the filter, i.e., the ratio of pore area to filter area, are parameters which influence the dust retention capacity of the filter. After operation begins, particles are transported into the inner part of the filter as well as retained right on the entrance side. The degree of dust passage drops through narrowing and covering the pores with simultaneous increase of the pressure drop until only the largest pores remain open. These too are temporarily narrowed through particle agglomeration. But after a while the agglomerates may be broken up again through particle impaction or the forces of triction. This usually happens with quartz dust. Other dusts with a tendency to stick together produce a higher pressure drop. The life span of particulate filters is assessed for filters used in respirators on the basis of human physiological limiting conditions.

28229 **APTIC NO. 50325**

Figge, H.

PROBLEMS OF ENVIRONMENTAL SAFETY IN THE AREA OF ELECTRO-IMMERSION PAINTING. *(Umweltschutz-Probleme in Betriebsbereich der Elektro-Tauchlackierung). Text in German. Fette, Seifen, Anstrichm., 75(2):105-107, Feb. 1973. (Presented at the DGF-Vortragstagung, Giessen, West Germany, Oct. 10, 1972.)*

General problems and possibilities of environmental protection in electro-immersion coating plants are outlined. The actual emissions from drying ovens are far below the acceptable limit of 375 mg of carbon/N cu m, which is principally due to the nearly exclusive use of oven originally designed for conventional lacquer systems with much higher organic solvent content than immersion lacquers. Increasing vent stack height of the additional installation of stack ejectors are usually suitable for abating odor nuisances in the neighborhood if immersion-coating plants. Two-stage wet scrubbing, especially a combination of acid scrubbing by means of hypochlorite with subsequent ozonization, the latter for destroying malodorous and toxic chlorophenols possibly resulting from chlorination, has proven highly effective on many occasions. Catalytic afterburning of waste gases may involve the problem of catalyst poisoning, while thermal afterburning requires auxiliary energy. A combination of catalytic with thermal afterburning is the most promising control method. Ozonization of vent gases is possible only if the gases to be treated are both small in volume, and relatively slightly polluted.

28230 **APTIC NO. 50138**

Furniss, J. E. and A. J. Weir

GRANULAR ACTIVATED CARBONS FOR AIR TREATMENT. *Filtration Separation (Purley), 10(1):35-37, Jan.-Feb. 1973.*

Various actual and potential uses of activated carbons as adsorbents are surveyed. Granular activated carbons are commercially available with surface areas ranging from 500,000 to 1,500,000 sq m/g and granular sizes from 12 to 0.3 mm. A typical air treatment carbon would have an overall surface area of 1,000,000 sq m/g and an average size of 2 mm. Granular activated carbon is suitable for the purification of recycled air, e.g., in air conditioners and in cooker hoods. A linear flow rate of 40-100 ft/min, a residence time of at least 0.1 sec, and an expenditure of 50 lbs of carbon/1000 cu m are best for air conditioning purposes. Activated carbons possess the highest adsorption efficiency (20-25%) for acetone, benzene, carbon disulfide, chloroform, ether, mercaptans, and xylene, and a very low efficiency of less than 1% for carbon dioxide, carbon monoxide, formaldehyde, hydrogen chloride, and hydrogen sulfide. Activated carbon is especially suitable for solvent recovery from gases containing solvent vapors usually in the concentration range of 1-2%. Carbon filters with unidirectional gas flow and intermittent desorption by steam counterflow, annular beds, and recently developed continuous solvent recovery plants with carbon packed into segment boxes around a rotating adsorber indexed for adsorption, desorption, drying, and cooling, are the main types of equipment used for solvent recovery. Solvents which can be removed satisfactorily by carbon include acetone, benzene, ethanol, ethyl acetate, ethyl ether, tetrahydrofuran and perchlorethylene. Activated carbon is further suitable for controlling hydrocarbon emissions from automobiles, as demonstrated by the Emission Loss Control Device used in U. S. car models. Carbon impregnated with potassium idodide and tetraethylenediamine is used to trap radioactive iodine 131 at nuclear power stations, and another special grade of carbon is suitable for retaining 90% of all mercury from gases. Ozone produced by electrostatic precipitators is catalyzed to oxygen by active carbon. In the presence of air, active carbon can remove minute concentrations of hydrogen sulfide by catalytically oxidizing the gas and fixing elemental sulfur into the carbon.

28231 **APTIC NO. 50012**

Gloger, Josef

FIELDS OF APPLICATION AS WELL AS SIMILARITY CONDITIONS AND MODEL LAWS FOR THE CYCLONE. *(Einsatzgebiete sowie Aehnlichkeitsbedingungen und Modellgesetze fuer den Zyklonabscheider). Text in German. Energietechnik, 23(2): 66-71, Feb. 1973. 20 refs.*

The cyclone is widely used in industries for dust collection. But it will increasingly lose importance as single collector and will be used more as a preliminary separator for coarse dust in combination with the electrostatic precipitator, cloth filters, and wet collectors. As a preliminary separator, no other type of collector can compare with the cyclone. An exact advance calculation of the collection efficiency of cyclones is difficult because of the complex multi-phase flows in the cyclone and the dust strand formation on the cyclone wall which is influenced by the type of dust and the dust load. Model laws and dimensionless parameters were derived from a model cyclone which can be transferred to large-scale cyclones of geometric similarity.

28232 **APTIC NO. 50015**

Grammel, R.

ENVIRONMENTAL TREE CUTTING TECHNIQUES. *(Umweltfreundliche Holzerntetechnik). Text in German. Allg. Forstz., 28(12): 227-230, 1973.*

With the modernizing of tree cutting techniques, high capacity machines with heavier engines have come into use which are a source of noise and polluting exhaust gases. Particularly unfavorable for the environment is the mobile use of high-capacity machines (300 to 500 cu m/day) along trails in the forest. Since storage space for logs is not available in abundance in most cases, the cut and prepared trees must be picked up by trucks which means that daily 15 to 20 trucks are necessary for the off-transport. More favorable to the environment and causing less pollution of the unspoiled forest air is concentrating the activity in the forest to the mere cutting of trees. Any preparatory treatment like de-barking or removal of branches is performed at central preparation stations adjoining wood working industries.

28233 **APTIC NO. 50343**

Hiraoka, Masakatsu

TECHNICAL VIEW OF ENVIRONMENTAL CONTROL SYSTEM. *(Kankyo Seigyo gijutsu no tenbo). Text in Japanese. Hitachi Hyoron, 55(3):65-71, March 1973.*

Desulfurization of flue gas has been the most extensively studied problem in air pollution control techniques. Two major processes are generally applied in the desulfurization of flue gas, namely, the wet method based on chemical absorption and dry method based on catalytic oxidation. Most of the recently developed wet processes are recycling absorbents such as the potassium sulfite solution (Welman Load method), magnesium hydroxide (Chemico method), and slurry of manganese dioxide complex salt. The absorbents are collected, regenerated, and recycled and sulfur dioxide is recovered as sulfuric acid or gypsum. Air pollution can be effectively controlled by a suitable arrangement of fixed sources and by enforcing emergency regulations including the change to better quality fuel.

28234 **APTIC NO. 50129**

Hori, Shoichiro

METHOD TO REMOVE SULFUR DIOXIDE FROM EXHAUST GAS. *(Nisankaiwo ganyu haigasu kara nisan-*

kaiwo o jokyosuru hoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-1301. 4p., Jan. 16, 1973. (Appl. Dec. 30, 1970, 1 claim).

Sulfur dioxide in stack gas can be removed by contacting it with a magnesium-containing liquid. This avoids the shortcomings of the lime-gypsum slurry method (the slurry is inconvenient to handle and clogs the device) and preserves its advantages. The SO2-containing gas is contacted with a liquid containing magnesium hydroxide to produce magnesium sulfite. The liquid containing magnesium sulfite is oxidized to produce magnesium sulfate which is treated with lime to produce gypsum and magnesium hydroxide.

28235 **APTIC NO. 50109**

Hotta, Kazuyuki, Noboru Yamamura, Mariko Horibe, and Koichi Iiya

COOLING OF GAS IN THE DUCT SYSTEM. *(Dakuto-kei ni okeru gasu reikyaku). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 221-223, 1973. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper B212.)*

Water can be used to flow down the outer surface of the duct in a bag filter or can be sprayed on the duct to cool the air and thus increase dust collecting efficiency. The influence of the change in the behavior of the gas with hanging temperature and the effect of the axial heat stream within the wall of the duct are discussed. This system can be used in dust collection at electric furnaces.

28236 **APTIC NO. 50130**

Ikeda, Hironosuke, Mitsunori Hara, and Shuko Furukawa

AIR POLLUTION PURIFICATION DEVICE. *(Osenkuki no jokasochi). Text in Japanese. (Sanyo Electric Co., Ltd., Moriguchi (Japan)) Japan. Pat. Sho 48-1302. 3p., Jan. 16, 1973. (Appl. Dec. 14, 1970, 1 claim).*

A device is described which cleans air or stack gases by electrochemically oxidizing or reducing hydrocarbons, carbon monoxide, or nitrogen oxides. The electrolyte is sandwiched between two porous catalytic electrodes and an electric heater is buried in the electrolyte to keep the electrolytic element heated at 400-700 C. One of the outer electrodes is exposed to the polluted air or gas and turned positive. Then the outer electrode performs electrolytic oxidation and the inner electrode performs reduction. Thus, HC and CO are oxidized to carbon dioxide. Then the electrode is switched to negative so that NOx is reduced to nitrogen.

28237 **APTIC NO. 50084**

Ishibashi, Kazuharu, Makoto Kimijima, and Masumi Atsukawa

PRESENT STUDIES ON WET DESULFURIZATION AT THE AMAGASAKI-HIGASHI POWER STATION. *(Amagasaki-Higashi hatsudensho ni okeru shisshiki haien datsuryu no kenkyu jokyo). Text in Japanese. Karyoku Hatsuden (Thermoelectric Power Generation), 23(2):136-144, Feb. 1973.*

A pilot desulfurization plant for wet desulfurization of power plant waste gases by the calcium hydroxide-calcium sulfate method is described. The test facility was attached to a 156 MW generator using heavy oil; the capacity was 100,000 N cu m/hr gas treatment corresponding to 35 MW and 80% sulfur dioxide removal. The process includes exhaust gas cooling, mist removal, preparation of raw materials, absorption, oxidation, separation of CaSO4, dust removal, and reheating of exhaust gas. The test plant had 90% sulfur removal efficiency. Dust was reduced to 10-15 mg/N cu m at the outlet from 30 mg/N cu m at the inlet. Calcium sulfate of 98% purity was obtained as a by-product.

28238 **APTIC NO. 50341**

Kano, T., H. Takahashi, and S. Shibuya

INSIDE-SHOP DUST COLLECTING SYSTEM. *(Kenoku shujin shisutemu). Text in Japanese. Hitachi Hyoron, 55(3):84-89, March 1973.*

The heated upstreaming air can be measured using a number of wind velocity meters installed at a certain height in the inside-shop dust collector and by determining the lengths of diffusion of the two dimensions at this height. Photographic analysis is usually applied to study the moving conditions of the upstreaming air. Visible particles are mixed into the upstreaming air and photos are taken at constant distance. The films are projected onto a measuring scale and corrections of the discrepancies of angle and distance on photographing are made, and from the scale the moving velocity of the upstreaming air can also be determined.

28239 **APTIC NO. 50126**

Kasaki, Ryoichi

GAS PURIFICATION DEVICE. *(Kitai no jokasochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-1298. 3p., Jan. 16, 1973. (Appl. Oct. 26, 1970, 1 claim).*

A device is described in which polluted gas such as automotive exhaust gas is fed into a hose containing a cleaner liquid which adsorbs and neutralizes the pollutants. The device can be attached to an automobile exhaust pipe. When no exhaust gas is fed in, the hose becomes flat, thus limiting the cleaner liquid inside to a very small quantity. When the engine starts, the hose is quite flat and filled with the liquid, so the exhaust back pressure is very high. This exhaust pressure opens the pressure valve in the exhaust pipe and allows exhaust to enter the hose. Liquid is pushed out of the hose through the upper end, the pores of the hose are expanded, and bubbles are ejected through the pores. This causes the pressure to drop and the pressure valve to close. With the pore expansion, fresh cleaner liquid enters the hose and cleans the internal wall of the hose. The cleaned gas is discharged through the discharge port in the top side of the casing.

28240 **APTIC NO. 50085**

Kasaoka, Narimitsu, Motoo Kabayashi, and Setsuo Inoue

DRY CATALYTIC REDUCING REACTION FOR NITROGEN OXIDES. *(Sanka chisso no kanshiki seeshoku kangen hanno ni tsuite). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 25 27, 1973. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper A103.)*

The catalytic reduction of nitrogen oxides by carbon monoxide was studied. Fifty co-precipitated catalysts were prepared, and those catalysts which hinder the production of ammonia as a by-product were studied. Reactions of the NOx-CO-water-nitrogen systems were examined with respect to reaction rate. The catalysts were prepared by a method in which co-precipitation occurred using an aqueous mixed nitrates solution and an aqueous sodium carbonate solution.

28241 **APTIC NO. 50091**

Kasaoka, Narimitsu, Yusuke Handa, and Meiji Ito

REACTION OF SULFUR OXIDES WITH VARIOUS METAL OXIDES. *(Iou sankabutsu no kakushu kenzoku sankabutsu to no hanno ni tsuite). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 46-48, 1973. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper A110.)*

The dry catalytic reduction of sulfur oxides is discussed. About 60 kinds of metal oxides were tested for reactivity with sulfur dioxide. The reactivity of the systems SO2 plus nitrogen and SO2 plus oxygen plus N2 with sulfates of the metals and decomposition of the sulfates were examined. The ferrite system with the Spinel structure, copper oxide-cobalt oxide, copper oxide-aluminum oxide, and copper oxide-cobalt oxide-ferric oxide systems reacted easily with SOx, particularly sulfur trioxide.

28242 **APTIC NO. 50127**

Kawamura, Fumio and Koichi Arai

WATER SEALING DEVICE. *(Suifu sochi). Text in Japanese. (Babcock Hitachi Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1299. 3p., Jan. 16, 1973. (Appl. Dec. 30, 1970, 1 claim).*

Waste gases containing carbon monoxide and sulfur dioxide from an oil refinery can be used with heavy oil to fuel a boiler. A water sealing device is used in the boiler to open and close the gas channels to the boiler and stack. When the boiler is not operating, the channel to the boiler is closed and the channel to the chimney is opened. The tube is made of stainless steel to avoid some SO2 corrosion; however, all corrosion cannot be avoided because of the high temperatures. This invention provides a water-cooling jacket around the tube so that the water sealing may be cooled and corrosion avoided.

28243 **APTIC NO. 50128**

Kawamura, Fumio and Koichi Arai

WATER SEALING DEVICE. *(Suifu sochi). Text in Japanese. (Babcock Hitachi Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1300. 3p., Jan. 16, 1973. (Appl. Dec. 30, 1970, 1 claim).*

An improved water sealing device is described used with a boiler which rocovers waste gas heat from an oil refinery. The seal closes and opens channels to the chimney and to the boiler. These channels are made of stainless steel which can become corroded at the high temperatures. To minimize the corrosion, the lower end of the stainless steel tubes are surrounded with a water pipe provided with a number of water nozzles. Water is sprayed around the tube to prevent it from contacting the corrosive water in the water seal tank directly and to cool the tube to avoid carbonization.

28244 **APTIC NO. 50112**

Korotyuk, K. I.

CUPOLA FURNACE PROVIDED WITH DUST CATCHING AND CO AFTERBURNING EQUIPMENT. *(Vagranka s ustroystvom pyleulavlivaniya i dozhiganiyem CO). Text in Russian. Liteinoe Proizvod., no. 2:40, 1973. 1 ref.*

A wet scrubber for the separation of cupola furnace-generated dust is described. The scrubber uses recycled water at a rate of 20 cu m/hr under 2.5-3 atm pressure. Special nozzles are used to prevent clogging, and they are adjusted to generate large-drop spray for minimum vapor entrainment and high efficiency. A patented CO afterburning chamber using no elecricity or natural gas for afterburning is incorporated in the scrubber.

28245 **APTIC NO. 50854**

Kuehnen, Gustav and Karl-Wilhelm Seebohm

DUST CONCENTRATIONS AND TECHNICAL MEASURES FOR THE PREVENTION OF DISEASES AT THE USE OF LEAD-CONTAINING SEPARATING DISCS SHOWN BY THE EXAMPLE OF THE IRON AND STEEL INDUSTRY. *(Staubkonzentrationen und technische Massnahmen zur Verhuetung von Erkrankungen bei der Verwendung bleihaltiger Trennscheiben, gezeigt am Beispiel eines Unternehmens der Eisen-und Stahlindustrie). Text in German. Staub, Reinhaltung Luft, 33(3):109-114, March 1973. 2 refs.*

During the cutting of steel by discs, fillers containing hazardous materials are frequently used to increase cutting efficiency and quality. The dust produced during cutting may have injurious effects on the operators health, if no special protective measures are taken. One such measure is the drawing off of the dust at the point of origin. Since this is difficult with rapidly rotating discs, the problem can be solved only by entire encapsulation of the dust source. The more complete the dust producing process is enclosed, the more dust is drawn off and the less air has to be drawn off. The drawn-off air must be conducted over short straight pipes to avoid unnecessary resistance and incrustations. It is expedient to install a preliminary collector for coarse dust after the severing machines with different encapsulations and exhaust capacities showed that with total encapsulation the lead concentration was on the average 0.03 mg/cu m; with partial encapsulation and an exhauster capacity of 1000 cu m/hr the lead concentration was between 0.12 and 0.16 mg/cu m.

28246 **APTIC NO. 50116**

Kunioi, Yoshinobu and Yukiyoshi Nishimachi

DECOMPOSITION AND REMOVAL METHOD OF ORGANIC BROMINE COMPOUNDS. *(Yuki shusokagobutsu no bunkai jokyo hoho). Text in Japanese. (Asahi Glass Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1297. 4p., Jan. 16, 1973. (Appl. Oct. 21, 1970, 1 claim).*

Methyl bromide can be removed from waste gas by contacting it with a metal oxide such as iron, manganese, cobalt, or copper oxide at below 500 C under pressure. The methyl bromide decomposes into hydrogen bromide and bromine which can be removed from the waste gas. Methyl bromide decomposition can be carried out with high efficiency even when the methyl bromide concentration in the gas is extremely low. The contact time is determined according to the contact ratio between the gas and the metal oxide, methyl bromide concentration, kind of metal oxide, and temperature. Removal efficiency increases with increased amounts of metal oxide. Better contact of the gas and metal oxide is obtained through the diffusion effect when the gas flow speed is sufficiently high. If it is too high, however, the contact time will become too short, so the optimum flow velocity should be selected. Practical applications of this method are discussed.

28247 **APTIC NO. 50078**

Kwanten, F. J. G.

CLEANING INDUSTRIAL WASTE GASES. *(Reiniging van industriele gassen). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 28(5):143-150, March 1973. 16 refs.*

Design problems of absorbers for industrial gases and waste gases such as sulfur dioxide and nitrogen oxides are described. The absorption column diameter is determined by the gas load, while the column height is a function of the desired cleaning effect. Packed columns for constant gas and liquid throughput require small-size rings for large column diameters. Small column diameters require increased plate-to-plate distances. The number of transfer stages for packed columns and of theoretical plates for plate columns is dependent of the required cleaning efficiency. Theoretically, the efficiency of any gas absorption apparatus is a function of the amount of new interfaces generated per unit of time, and of the total amount of existing interfaces between liquid and gas. An example concerning options for controlling NOx emissions from nitric acid synthesis shows that NOx abatement to 500 to 800 ppm through increasing the capacity of the absorption system would constitute an economic optimum, while further reduction of 300 ppm would entail a cost increase of 10%. Catalytic reduction of the nitrogen oxides to nitrogen by natural gas, hydrogen, carbon monoxide, hydrocarbons, and possibly by ammonia represents a more economical solution. The reduction process using natural gas starts at a temperature of 450 C to reach an end temperature of 850 C.

28248 **APTIC NO. 50067**

Makino, Kazutaka, Fumikazu Igazaki, and Koichi Iiya

ELECTRIC DUST-DROPPING CHARACTERISTICS IN DUST COLLECTING FILTERS. *(Shujin firuta ni okeru denkiteki funjin haraiotoshi tokusei). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 218-220, 1973. 3 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper B211.)*

A new dust collector combining the advantages of a bag filter and electrostatic precipitator is described wherein filters and electrodes are arranged in a special way. Dust is collected on the surface of a filter and subjected to a high voltage so it falls off the filter. Experimental results compared well with theoretical values. Even where there was no effect of corona discharge, a sufficiently practical dust-dropping efficiency was obtained.

28249 **APTIC NO. 50117**

Mori, Yasuo, Kazutomo Otake, Naoyoshi Ando, and Noriyuki Sakai

DECOMPOSITION REACTION OF NITRIC OXIDE ON THE SURFACE OF ALUMINA. *(NO no arumina hyomen ni okeru bunkai hanno). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Tokyo, p. 89-92, 1973. 2 refs. (Presented at the Japan Society of Mechanical Engineers, Annual Meeting, 50th, Tokyo, Japan, April 2-4, 1973, Paper 904.)*

The decomposition of nitric oxide on the surface of alumina was studied to confirm how high-temperature nitrogen oxides are decomposed in large scale plants lined with alumina or magnesia. A combustion gas was passed through a 99.2% sintered alumina tube with a 1-meter diameter and 2-meter length. The NO concentration was lowered in inverse proportion to the increase of tube-wall temperature. At 600 C, NO reduction was negligible; at 792 C it was 180 ppm; at 837 C it was 230 ppm; and at 943 C it was 430 ppm. The NO reduction was not due to adsorption on alumina and was not affected by the initial NO concentration. The decomposition reaction rate was remarkably temperature dependent below 720 C, but slightly above 850 C. It was 1.6 times 10 to the -9th power mol/sq cu s at 790 C.

28250 **APTIC NO. 50122**

Morishita, Hiroshi, Yasuyuki Kihara, and Etsuo Makita

MANUFACTURING METHOD OF HIGH-PURITY, GRANULAR ANHYDROUS SODIUM SULFITE. *(Kojundo ryujo musuiaryusansoda no seizoho). Text in Japanese. (Nippon Soda Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1315. 4p., Jan. 16, 1973. 3 refs. (Appl. Jan. 30, 1967, 1 claim).*

A method of manufacturing high-purity, granular sodium sulfite with an average particle size of 0.15 mm or larger is described. The new method is based on adding high-concentration caustic soda to a solution of sodium sulfite while the caustic alkali concentration in the sodium sulfite separation section is kept at 10% or lower, and obtaining crystals of the anhydrous sodium sulfite which are considerably larger than those of powder anhydrous sodium sulfite. The sodium sulfite water solution containing caustic soda is reacted with sulfur dioxide to obtain a high-concentration water solution of sodium sulfite containing no acidic sodium sulfite. The solution then is mixed with sodium sulfite in a water solution containing crystals of anhydrous sodium sulfite amounting to 10% in terms of slurry concentration and whose caustic soda concentration is kept at 10% or lower, thereby separating and growing crystals of anhydrous sodium sulfite to obtain larger crystals. The mother liquid from which the crystals have been separated is then reacted again with SO2 to obtain a sodium sulfite water solution which is recirculated.

28251 **APTIC NO. 50200**

Moriwake, Yoshio, Kazuji Fukunaga, Kikujiro Kihara, and Susumu Abe

MANUFACTURING METHOD OF ACTIVE CARBON USED IN DESULFURIZATION. *(Datsuryuyo kasseitan no seiho). Text in Japanese. (Chugoku Sangyo Co., Ltd., Bizen (Japan)) Japan. Pat. Sho 48-1592. 2p., Jan. 18, 1973. 1 ref. (Appl. June 14, 1968, 1 claim).*

The adsorption/reaction power for sulfur dioxide removal of activated carbon becomes less when it is removed from the activating furnace and exposed to air while hot; however its physical adsorption power is unaffected. Oxidation of activated carbon at higher temperatures adversely affects the adsorption/ reaction power more than at lower temperatures. Therefore, a new manufacturing method was developed in which activated carbon is cooled to 200 C or less and not exposed to air before it is removed from the furnace. The cooling gas can be nitrogen, activation reaction gas produced during activation, inert combustion gas, or their mixture, provided it contains 3% or less oxygen.

28252 **APTIC NO. 50202**

Nakamura, Harutoki

EXHAUST GAS CLEANER. *(Haikigasu jokasochi). Text in Japanese. (Matsushita Electric Industrial Co., Ltd., Kadoma (Japan)) Japan. Pat. Sho 48-983. 4p., Jan. 12, 1973. (Appl. Dec. 17, 1969, 1 claim).*

A catalytic afterburner for automobiles is described which features a lightweight, high-performance cobalt oxide and chromium oxide catalyst using a glass chopped strand carrier. The afterburner is divided into three compartments, the front and rear compartments are empty and the middle one contains the catalyst; it is attached to the exhaust pipe of the automobile. The method of manufacturing the catalyst is described. The catalyst layer is 15-30 wt% of the strand carrier and contains 70-73% cobalt oxide and 25-30% chromium oxide.

28253 **APTIC NO. 50071**

Nichols, Richard A.

HYDROCARBON-VAPOR RECOVERY. *Chem. Eng., 80(6):85-92, March 5, 1973.*

A low-temperature, recirculating, absorption system for the recovery of hydrocarbon vapors is described. The incoming vent gases of unknown composition pass through a large saturator tank, where the vent gases are saturated with fuel, and the entrained liquid is allowed to settle out before passing to the air compressor. As the gases pass from the saturator to the vapor compressor, they are brought to a pressure of 45 psig, and an approximate temperature of 300 F. As they proceed to an aftercooler, where the temperature is reduced to ambient, the gases are allowed to pass through a bubble bar into the absorber, where they are cooled by passing through cold liquid of -10 F. Because the hydrocarbons are absorbed here by sprayed gasoline, essentially hydrocarbon-free air is discharged through the top of the tank. This minimum-cost system is capable of recovering 90% of the hydrocarbon vapors present in saturated vapor-air mixtures at gasoline loading and storage installations.

28254 **APTIC NO. 50066**

Podolski, A. A., V. I. Turubarov, and Ye. I. Pominov

CALCULATION OF THE VELOCITY AND ORIENTATION TIME OF AEROSOL PARTICLES IN ELECTROSTATIC FIELD. *(Raschet skorosti i vremeni povorota aerozolnykh chastits v elektrostaticheskom pole). Text in Russian. Kolloidn. Zh., 35(1):63-68, 1973. 5 refs.*

Approximate calculations of the orientation time and angular velocity of ellipsoidal aerosol particles in the micron range in electrostatic fields of different intensities are described. Periodical orientation with maximum angular velocities of 40-

44 deg were determined for particles present in electrostatic fields of low intensity of 1-3 kV/cm. Particles in high-intensity electrostatic fields (5-10 kV/cm) perform orientation due to relaxation of the oscillations around an equilibrium position. The maximum angular velocity was calculated to be 20 deg. Particles with large mass assume oscillatory motion in fields with relatively low intensity in the 5-10 kV/cm intensity range. Increase in the angular velocity with increase in either size or dielectric permeability of the particles was determined. At high field strength, the orientation time is much shorter than the charging time of a particle in an electrostatic precipitator, and therefore, it is possible to neglect the orientation time when investigating the charging of nonspherical particles.

28255 **APTIC NO. 50131**

Poetschke, Herbert

DUST COLLECTION AND COMBUSTION. *(Entstaubung und Verbrennung). Text in German. Wasser Luft Betrieb, 17(3):86-91, 1973. 4 refs.*

All measures against air pollution require knowledge of the actual pollutant concentration of the atmosphere which necessitates a number of different measurement units. Gas chromatography plays an important role in air monitoring. In the U. S. it is considered the only useful method for the measurement of hydrocarbons in the ambient air. A unit operating with gas chromatography has been brought onto the West German market. With it carbon monoxide, methane, and total hydrocarbon concentrations can be determined. Four, six or twelve fully automatic analyses can be performed per hour. For measurement of the dust concentration indoors and outdoors the konimeter is used. For emission monitoring in a thermal power plant, a sampling probe is installed in the stack. The sampling probe is made of special material which does not absorb sulfur dioxide. In the probe head a dust filter is installed. Via a second fine dust filter, the gas is pumped to the anlayzers (infrared analyzer for SO2). Electrostatic precipitators and cloth filters are widely used for dust removal. A review of their operating principles is given. For a new steel manufacturing plant with an oxygen lancing converter, a wet electrostatic precipitator with water circulation was selected. Another steel manufacturer in West Germany has developed a new method for disposal of its solid waste products by composting to avoid the emissions from incineration. The solid waste material is mixed with sludge from water purification and homogenized in a rotating drum with simultaneous biological decomposition. A novel underpressure drum ventilation helps to accelerate the decomposition process.

28256 **APTIC NO. 50378**

Rathgeber, F.

LARGE INCINERATORS FOR WASTE AND GARBAGE. *(Grossanlagen fuer die Verbrennung von Abfall und Muell). Text in German. Energie Tech., 25(1):11-15, 1973.*

For the incineration of larger quantities of garbage, grate-equipped incinerators are mostly used. They can be roughly divided into two groups, ashing plants without heat utilization for steam production and incinerators with heat utilization. In ashing plants all waste products are burned to harmless residual matter which poses no leaching problems when dumped. The flue gas heat can still be used for the drying of sewage sludge. Waste ashing plants are equipped with afterburners where the flue gases are burned at a temperature of 800 C. For cleaning and cooling of the flue gases various methods can be applied. They include indirect cooling of the flue gases with air and subsequent scrubbing, evaporation cooling with electrostatic precipitation, or radiation cooling with following electrostatic precipitation. The forward stoking grate can be used for both the ashing plant and the incinerator with heat utilization. Incinerators with Martin backward stoking grate are likewise used for small incinerators without heat utilization (capacity 40 t/day) as well as for large plants with heat utilization for power production (capacity 2400 t/day). These incinerators are equipped with electrostatic precipitators for retention of the fly dust. The latter is drawn off pneumatically and added to the slag after the magnetic separators, and then dumped with the slag. The rotary kiln is used for mainly for the incineration of liquid and pasty industrial waste products. To an increasing extent the sludge from sewage purification plants is burned in such kilns. The vapors which develop at the incineration of these waste products are liberated from dust in a scrubber and deodorized by catalytic afterburning. In conclusion incinerator charging and ash tap-off problems are discussed.

28257 **APTIC NO. 50121**

Saito, Yo, Masao Yokoi, and Shigeo Itaya

METHOD TO REMOVE SULFUR DIOXIDE FROM SINTERING FURNACE EXHAUST GAS. *(Shoketsu higasu chuno aryusangasu jokyohoho). Text in Japanese. (Nippon Kokan Kabushiki Kaisha, Tokyo (Japan)) Japan. Pat. Sho 48-1304. 7p., Jan. 16, 1973. (Appl. Nov. 15, 1970, 1 claim).*

A desulfurization method for removal of sulfur dioxide from sintering or other exhaust gas is described. The exhaust gas is contacted with a solution of ammonium sulfite to produce acidic ammonium sulfite which is contacted with coke oven gas containing ammonia to reduce it to ammonium sulfite which can be recirculated for contact with the exhaust gas. The concentration of the absorbent is kept at a level so that ammonium sulfite and acidic ammonium sulfite may be 20 wt% or higher and the quantity of acidic ammonium sulfite may be 10% or more of the quantity of ammonium sulfite plus acidic ammonium sulfite. Part of the circulating absorbent is removed and contacted with sulfuric acid to produce sulfate. The sulfate is heated to produce sulfur dioxide which is adsorbed by active carbon. The active carbon is then washed with water to recover dilute sulfuric acid.

28258 **APTIC NO. 50124**

Sakai, Kenichi and Etsuji Nomura

MANUFACTURING METHOD FOR A DILUTE SULFUR DIOXIDE ABSORBENT. *(Kihaku aryusangasu kyushuzai no seizohoho). Text in Japanese. (Mitsui Mining and Smelting Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1312. 2p., Jan. 16, 1973. (Appl. Oct. 27, 1972, 2 claims).*

A method of manufacturing a manganese carbonate absorbent that can be used to fill a packed absorption column for sulfur dioxide removal is described. The water content of the manganese carbonate is adjusted to 10-15% by a granulating machine. The granules are sintered at 1000-1200 C to obtain the absorbent. Granulation can also be promoted when sulfuric acid, manganese sulfate, or pulp waste liquid are added prior to granulation. The manganese carbonate was used to fill an absorption column measuring 340 mm in diameter and 1500 mm in height. Gas containing 0.2% SO2 was fed into the column at 0.52 cu m/min while 10 l/min of water was sprayed from above. The SO2 removal efficiency was 98%.

28259 **APTIC NO. 50135**

Scheers, A. H.

SAFETY SYSTEMS AND AIR POLLUTION. *(Veiligheidssystemen en luchtverontreiniging). Text in Dutch. Polytech. Tijdschr., Ed. Procestechniek (The Hague), 28(6):171-177, March 1973.*

Safety torches for pressure release for various operations, and emission standards are described. The duration of safety releases usually does not exceed 20 min. Gases that are permitted to be released directly into the atmosphere are discharged through vent stacks installed within the plant premises, possibly under admixture of steam to prevent ignition. Gases not allowed to be released directly into the atmosphere are led through knockout drums for liquid separation and water seal vessel to be discharged through high torches. Incineration is done at the top of the torch stack. The plume dispersion from elevated flares, and thus the ground-level pollutant concentration, is dependent on atmospheric stability, wind speed, flue gas exit speed, and gas temperature. The maximum allowable concentrations of air pollutants, determined for 8-hour exposure of normal subjects, may be considerably exceeded in emergency situations. The much lower 24-hour limits are determined for the general population, including abnormally sensitive subjects. The maximum allowable concentrations determined for sulfur dioxide, hydrogen sulfide, ammonia, carbon monoxide, chlorine, and carbon disulfide are 13, 15, 35, 3, and 60 mg/cu m, respectively.

28260 **APTIC NO. 50065**

Schneidt, H.

A LIME KILN WITH OIL FIRING IN THE SUGAR INDUSTRY. *(Ein Kalkschachtofen mit Oelfeuerung in der Zuckerindustrie). Text in German. Z. Zuckerind., 23(3):139-140, 1973.*

The construction and operating results of an oil-fired lime shaft kiln producing 95 tons of lime/day in a sugar factory in Iraq is described. As a fuel, preliminarily heated fuel oil is injected. The primary air flowing into the chambers cools the nozzle head and prevents soot and coke formation. The kiln is marked by great simplicity. In the bottom section six oil gasing chambers are radially arranged. Above the chambers there are openings in the wall for the entrance of waste gas. No disadvantages were observed concerning the use of waste gas instead of coke heating gas.

28261 **APTIC NO. 50174**

Scholl, Hermann

ELECTRONIC GASOLINE INJECTION WITH CONTROL BY AIR QUANTITY AND ENGINE REVOLUTION. *(Elektronische Benzineinspritzung mit Steuerung durch Luftmenge und Motordrehzahl). Text in German. Motortech. Z. (Stuttgart), 34(4):99-105, April 1973. 15 refs. (Presented at the Symposium ueber Autoelektrik, Brighton, England, Sept. 1972.)*

A new version of the electronic gasoline injection system Jetronic with air quantity measurement is described. The most pronounced change over the earlier Jetronic systems is the direct measurement of the air quantity drawn by the engine. The fuel quantity thus is controlled by the air quantity and the engine revolution. The air quantity drawn in by the engine acts on the flap barrier in the air quantity measuring instrument. The flap assumes a defined angular position in accordance with the air flow and the effective restoring force of a spring. A potentiometer which is actuated by the flap barrier supplies a voltage signal to the control unit. The signal supplied by the air quantity measuring instrument is a measure for the air quantity per time unit. From it a fuel quantity proportional to the air quantity per stroke is obtained by division in the control unit through the revolution number. With the new injection system, all injection valves are electrically switched in parallel. The valves inject simultaneously, however, with respect to the individual cylinders at various phases of the operating cycle. Through the use of this injection system, less auxiliary facilities for exhaust gas cleaning are required. The 1976 limit values for pollutants in the exhaust gas cannot be met by modification of the fuel injection system alone. A combination of the control and monitoring system for the auxiliary exhaust gas cleaning system with the Jetronic injection system would provide an optimum solution.

28262 **APTIC NO. 50047**

Schwartz, Werner

MODERN METALLURGICAL PROCESSES FOR COPPER PYRITE CONCENTRATES. *(Neuzeitliche Verhuettungsverfahren fuer Kupferkies-Konzentrate). Text in German. Erzmetall, 26(3):113-120, 1973. 18 refs. (Presented at the Kupferausschusses der GDMB, 32nd, June 24-27, 1972.)*

The conventional metallurgical process for copper pyrite caused air pollution particularly when no sulfuric acid was produced as a by-product from the off gases. Over the last few years several new methods have been developed of some which are successfully in operation. The reverberatory furnace of the conventional method produced large volumes of waste gas. The electric furnace, the Outokumpu, the Inco, and the Brixlegg processes fulfill much better the requirements for lower environmental pollution. With the Otokumpu process the heat liberated at the oxidation of iron and sulfur is used in the melting process. This heat covers largely the energy demands of the process. Auxiliary burners produce only small quantities of waste gas. The Inco process uses oxygen instead of air for the melting process. The advantage of this method is the simple way of recovering the SO2. Apart from these processes, the Worcra, Mitsubishi, and the Noranda methods are also promising.

28263 **APTIC NO. 50344**

Silex, Klaus

STATE-OF-THE-ART AND FUTURE PROSPECTIVES OF ENVIRONMENTAL PROTECTION IN THE FOUNDRY INDUSTRIES. *(Stand und Perspektive des Umweltschutzes in der Giessereiindustrie). Text in German. Giessereitechnik, 19(1-2):25-28, Jan.-Feb. 1973. 5 refs.*

State-of-the-art and future prospectives of emission control and noise abatement in the foundry industry of East Germany are outlined. The present situation is characterized by the predominance of small foundries with mostly obsolete equipment, located often within or close to residential areas which they pollute mostly with iron oxide-bearing dust. However, the share of foundry industries among polluting industries is fairly modest. Mineral dusts, dusts of iron oxide, light and heavy metals, coal, sulfur dioxide, hydrogen sulfide, carbon monoxide, carbon dioxide, phenol, ammonia, formaldehyde, chlorine compounds, hydrofluoric acid, xylene, benzene and gasoline are the principal pollutants emitted by foundries. The specific dust, SO2, and CO emissions per ton of casting are 38 kg, 0.82 kg, and 2.6 kg, respectively. Capture of all dust emissions, and installation of dust separators is of primary concern in foundry emission control. As it is usually impossible to effectively remove gaseous pollutants from vent and flue gases, such gases should be emitted through high stacks. The CO emissions can be practically quantitatively eliminated by the use of top firing cupola ovens with adequate secondary air control, or through afterburning in the stack. As emission control in foundries is technically possible, its realization is mostly a financial problem.

28264 **APTIC NO. 50216**

Tabasaran, Oktay

REFUSE REMOVAL AT ISTANBUL. *(Muellbeseitigung in Istanbul). Text in German. Muell Abfall, 5(2):46-48, 1973.*

The annual refuse quantity at Istanbul amounts to about 1 million tons; the main part is deposited on four deposit sites. Since the dumped refuse is not covered with soil or inert material, methane gas develops which provokes the formation of bad odors and many fires. Two incineration plants have been constructed having a throughput of 6 and 12 tons/hr, respectively. The smaller plant does not have any devices for cleaning the waste gases so the emitted air contains a great percentage of ash. The waste heat is used for heating a swimming pool. The larger plant is equipped with a water shower and a cooling cascade for cleaning the waste gases. The water which contains the flue ash passes through a sedimentation basin and is then used again for gas cleaning purposes.

28265 **APTIC NO. 50108**

Uchiyama, Hisashi, Naohiko Komeno, and Genyo Nishikawa

STUDY OF THE DESULFURIZATION OF EXHAUST GAS BY A POROUS PLATE WETTED STAGE TOWER

(2). (Takoban nuredanato ni yoru haien datsuryu no kenkyu (Dai 2ho)). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 241-243, 1973. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan April 3-6, 1973, Paper E107.)

The absorption efficiency, pressure drop, and flow condition in a porous plate wetted stage tower used to desulfurize exhaust gas are discussed. The wetted shelf has a higher absorption efficiency than former gas absorption equipment. The shelf was studied experimentally using a 5% sodium carbonate solution to absorb sulfur dioxide, a tower 200 mm in diameter, and three shelves spaced at 50 cm with an opening ratio of 0.3104 to 0.4900. If the number of shelves is increased to five or six, a 1000-2000 ppm SO2 concentration can be reduced to zero and the pressure drop will be 11-52 mm of water/shelf. With an absorption efficiency of more than 95%, the pressure drop will be 27 mm. When the speed of gas within the tower is increased, the pressure drop and liquid absorption is increased.

28266 **APTIC NO. 50201**

Uchiyama, Hisashi, Naohiko Komeno, and Genyo Nishikawa

THE TRANSFER OF MATERIAL IN THE CASE OF SO2 GAS ABSORPTION IN A WETTED TOWER -- ESPECIALLY IN EACH STAGE. *(Nuredanato ni yoru SO2 gasu kyushu no baai no busshitsu ido -- Tokuni kakudan deno busshitsu ido). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 244-246, 1973. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper E108.)*

The porous wetted stage tower gives excellent sulfur dioxide absorption, but there is a lack of data on material transfer for a multi-stage tower. Therefore, the compatibility of data obtained from a simple stage tower and data from a multi-stage tower was studied. Three stages were spaced 50 cm apart in a 20 cm in diameter tower with 31% openings of the porous shelves. A 5% sodium carbonate solution was used as the absorbent for air containing 1300 ppm of SO2. Gas entered the bottom part of the tower at 1-4 m/sec and absorbent was supplied from 10,000-50,000 kg/sq m/hr. Absorption was best at the top shelf and worst at the lowest.

28267 **APTIC NO. 50076**

Uehara Y. and E. Yanai

SMOKE, CO AND CO2 FROM CELLULOSIC MATERIALS TREATED WITH DAP IN A FIRE ENVIRONMENT. *J. Fire Flammability, vol. 4:23-41, Jan. 1973. 13 refs.*

An undyed rayon material and an undyed canvas material previously treated with diammonium phosphate (DAP) were subjected to tests of burning with various types of source of heat under conditions of adequate air supply. The four different burning tests applied were the 45 deg method, the electric furnace method, the large vertical furnace method, and the LOI method. Determinations in the combustion products of carbon monoxide, carbon dioxide, and smoke as a function of the DAP treatment concentration revealed a decrease or increase in the smoke and CO emissions with increased treatment concentration, the former occurring when the sample is exposed to a small fire or a heat of relatively low temperature and the latter being observed in the case of a large source of fire or a high temperature. So long as the intensity of a source of fire remains within the range of control of the retardant, the emissions of smoke and CO are small, but they increase when the limit is exceeded. This is a natural consequence from the nature of fire retarding treatment. Accordingly, it is necessary for measurement of the smoke and gases to burn the sample with a source of fire corresponding to a heat or temperature within the controllable range and that outside such range. For this purpose, a combination of the 45 deg method and the LOI method or measurements at 350 C, 500 C, and 750 C under the electric furnace method are recommended. Any treated materials producing a large amount of smoke and gases should be disapproved however they may suppress burning. For determination of the smoke and gas concentrations, the differential method is recommended from its fast response, correctness and good reproducibility.

28268 **APTIC NO. 50176**

Williams, N., G. Srinivasan, and P. Wechselblatt

REMOVAL AND RECOVERY OF SO2 FROM POWER STATION FLUE GASES. *(Beseitigung und Wiedergewinnung von SO2 aus den Rauchgasen von Kraftwerken). Text in German. Chem.-Ing.-Tech., 45(7):437-441, 1973. (Presented at the Dechema-Jarestagung, Frankfurt, West Germany, June 15-16, 1972.)*

The Chemico process developed in the USA for purifying sulfur dioxide containing flue gases from coal and oil fired power stations with the aid of an aqueous suspension of magnesium oxide is discussed. Removal of fly ash (if necessary) and absorption of SO2 is performed in venturi scrubbers with a low pressure drop more than 90% of the SO2 being removed. The 10 to 15% suspension is rendered alkaline to ensure optimum efficacy. The resulting MgSO3 is then dried and subjected to thermal decomposition, the MgO being recirculated and the SO2 content of the gases evolved being high enough to feed an economically funtioning sulfuric acid plant. A prototype plant of this kind was recently commissioned in a 150 MW oil-fired power station near Boston/Mass. The single stage absorber purifies 755000 cu m/hr flue gases, removing about 90% of the SO2. It is intended to install plant of this kind for flue gas purification in other American power stations.

28269 **APTIC NO. 50110**

Yagi, Masuo

ODORS FROM ANIMAL WASTES AND THEIR CONTROL. *(Chikusan ni kakawaru akushu to boshitaisaku). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(2):143-148, Feb. 1973. 12 refs.*

Odor disposal from animal wastes, garbage used as feed, and other sources is reviewed. Garbage odors include ammonia, amines, aldehydes, and fatty acids; they can be eliminated by introduction of a closed system or a deodorizing apparatus. Animal wastes have odors due to indol, scatol, sulfur compounds, amines, and ammonia; they can be eliminated by washing the animal sheds, drying or incinerating feces, and absorption on a soil layer. Offensive odors arising from the drying process which produces fertilizer are due to sulfide compounds. Odors decrease with lower drying temperatures. Odors can be eliminated by direct burning above 650 C, catalytic oxidation at 250-400 C, and the Shinko method (a combination of a dryer and incinerator).

28270 **APTIC NO. 50123**

Yamabe, Takero and Shinji Takai

ADSORBENT. *(Kyuchakuzai). Text in Japanese. (Mitsubishi Chemical Industries, Ltd., Tokyo (Japan)) Japan. Pat. Sho 48-1313. 3p., Jan. 16, 1973. (Appl. Nov. 16, 1970, 1 claim).*

A hydroxyapatite adsorbent is described which has good selective separation power and heat-resistivity. Several adsorbents are described including those with one OH radical replaced by fluorine, sulfate, or an anion, respectively. The manufacturing method of the adsorbent is described.

28271 **APTIC NO. 50090**

Yokoyama, Yoshio and Gibei Imano

GAS ABSORPTION AND REPRODUCTION OPERATIONS BY THE CLATHRATE METHOD. *(Karasuretoho ni yoru gasu kyushu oyobi seisei sosa). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 247-249, 1973. 3 refs. (Presented at the*

Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper E109.)

Gas absorption and reproduction operations were examined using a gas-equilibrium diagram of the clathrate method in which a solution of quinol in water is used for crystalizing out the clathrate crystal by absorbing a gas such as hydrogen sulfide, sulfur dioxide, or carbon dioxide. The reproduction and reuse of the quinol is easy because the clathrate is resolved when heated at 90 C. The vaporization of water at the reproduction temperature must be considered for the reproduction of quinol.

28272 **APTIC NO. 50360**

Yoshida, Koji, Suteichiro Saeki, Takenobu Sekido, Yujiro Minami, and Takao Hishinuma

SYSTEM OF SO2 REMOVAL FROM FLUE GASES. *(Haien datsuryu shitemu). Text in Japanese. Hitachi Hyoron, 55(3):72-83, March 1973.*

Desulfurization of flue gases can be divided into absorption methods, adsorption methods, catalytic oxidation methods, and reduction methods. Alkali solutions, alkali slurries, and metal oxides are usually used for the absorption and recovery of sulfur dioxide as sulfites, sulfates, and metal sulfates respectively. Activated carbon is generally used for the absorption of SO2 which is recovered as sulfuric acid or gypsum. The SO2 can be oxidized to sulfuric trioxide followed by absorption with H2O to form H2SO4. It can also be reduced to sulfur using hydrogen gas, carbon monoxide, or hydrogen sulfide and recovered as sulfur powder. Five Hitachi desulfurization systems using different absorbents, and adsorbents are described. The method using dry activated carbon as an adsorbent has a capacity of 420,000 N cu m/hr and an efficiency of more than 80%.

28273 **APTIC NO. 50115**

Yoshioka, Kazunari and Mitsuo Matsumoto

DISPOSAL METHOD OF NITROGEN OXIDES. *(Chissosankabutsu no shorihoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 48-1296. 4p., Jan. 16, 1973. (Appl. Oct. 19, 1970, 2 claims).*

A nitrogen oxides control method is described in which nitrogen dioxide is converted to nitrous acid and then nitrogen by contact with water and amino radicals. The NO2 is contacted with a water solution of urea, amino acid, polypeptide, glue, or their mixture. Conversion of nitric oxide to NO2 is accelerated with a decrease of NO2 in the bubbling stratum. The polypeptide and glue are the best foaming or bubbling agents since they give stable bubbling and contain the needed amino group. Another possible process uses an oxidizing agent to convert NO to NO2, after which the NO2 is contacted with a water solution of urea, amino acid, polypeptide, and glue or their mixture to convert NO2 to HNO2 and then N2.

28274 **APTIC NO. 50017**

Zebel, Guenter

THEORETICAL CONSIDERATIONS OF THE SEPARATION ACCORDING TO GRAIN SIZE IN A PRELIMINARY SEPARATOR TAKING ADVANTAGE OF THE FORCES OF INERTIA AND REFLECTION. *(Theoretische Betrachtungen zur Trennung der Korngroessen in einem Traegheitsvorabscheider unter Ausnutzung der Reflexion der Teilchen). Text in German. Staub, Reinhaltung Luft, 33(3):104-107, March 1973.*

If a dust-laden air jet strikes against a filter surface, a uniform separation of fine particles is obtained. In contrast, coarse particles will not follow the deviation of the jet and may strike in the region of the filter center and then be reflected. The elastic reflection may, for a Stokes number higher than a few tenths, considerably affect the course of the particle path. Thus, the coarse particles could reach the outer filter edge and be separated there. Finer particles are separated almost uniformly over the whole filter surface. Therefore, a segregation of fine and coarse particles occur; the latter is preferably separated at the filter edge.

1972

28275 **APTIC NO. 50195**

Ando, Toru

PROTECTIVE METHOD FOR AN ENGINE EQUIPPED WITH AN EXHAUST GAS PURIFICATION DEVICE. *(Haikigasu jokasochi o fusetsushita enjin no hogohoho). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-34729. 8p., Sept. 1, 1972. (Appl. Oct. 13, 1970, 1 claim).*

A water injection exhaust gas cleaner for automobiles is described in which no residual water is in the combustion chamber during and after engine revolution with the ignition switch off. Exhaust is reduced by injecting water into the combustion chamber equal up to 1/2 the fuel. The injected water evaporates during engine operation, thus lowering the temperature in the combustion chamber to reduce emissions. However, if the injected water remains in liquid form when the engine is stopped, it can cause corrosion of the engine and deterioration of the engine oil. This can be avoided by automatically closing the water control valve when the ignition is turned off. A delay device keeps the engine operating for some time after the ignition is turned off. Thus, no water remains in the engine after engine stop.

28276 **APTIC NO. 501**

Aoki, Teruo

DUST-REMOVING DEVICE. *(Jojin sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-25091. 2p., Aug. 5, 1972. (Appl. Aug. 1, 1969).*

Soot and dust from stack gas or air can be removed by a dust collector which consists of two bags, one inside the other. The gas flows into the inner bag, and the bag is sprayed with water from a spray nozzle suspended above the bags. The water forms membranes in each pore of the bag. As the air or gas breaks the membrane to get out of the inner bag, the particulates in the air or gas are arrested by the membrane. Water is caught by the outer bag and forms water membranes in its pores. As the air or gas flows out of the outer bag, soot and dust are again arrested. Used water is collected in the bottom of the bags and is drawn into a tank where it can be reused.

28277 **APTIC NO. 50261**

Austin, Thomas C.

AN EVALUATION OF A 1975 PROTOTYPE CHRYSLER PASSENGER CAR. *Office of Air Programs, Test and Evaluation Branch, Rept. 73-8, APTD-1383, 11p., Oct. 1972.*

The exhaust emission characteristics of a prototype passenger car were studied to determine the effects of system modifications on fuel economy, performance, and emission levels of hydrocarbons, carbon monoxide, and nitrogen oxides at various driving speeds and conditions. The control system included a pair of catalytic converters, exhaust gas recirculation, and air injection. With exhaust gas recirculation rates reduced, the car demonstrated the ability to achieve the emission levels required to meet the 1975 standards with high mileage on one catalyst and low mileage on the other catalyst: hydrocarbon and CO emissions decreased significantly but NOx emissions increased. The fuel economy of the prototype car was better than that of the average 1973 car of the same weight. Overall acceleration and driveability were comparable to those of the 1972 counterpart.

28278 **APTIC NO. 50262**

Austin, Thomas C.

A SECOND EVALUATION OF THE QUESTOR EMISSION CONTROL SYSTEM. Office of Air Programs, Test and Evulation Branch, Rept. 73-9, APTD-1384, 10p., Nov. 1972.

The exhaust emission characteristics of a passenger car equipped with the Questor emission control system were studied to determine the effects of the system on fuel economy and emission levels of hydrocarbons, carbon monoxide, nitrogen oxides, and particulates. The heart of the system is a pair of non-noble reduction catalysts sandwiched between partial thermal reactors. Carburetor calibration and exhaust port air injection rates were set so that the reducing atmosphere was still present after the exhaust gas passed through the first partial thermal reactor stage. After the exhaust gas passed through the NOx catalyst, additional air was added to complete combustion of the remaining hydrocarbons and CO. The system achieved the 1976 Federal emission levels at low mileage. Particulate emission levels were lower than those from conventional systems using leaded fuels. The system, however, caused a considerable loww in fuel economy (approximately 25%).

28279 **APTIC NO. 50165**

Batel, Wilhelm

THE ELECTROSTATIC PRECIPITATOR STATE AND TRENDS OF DEVELOPMENT. *(Der Elektroentstauber Entwicklungsstand und-tendenzen). Text in German. Staub, Reinhaltung Luft, 33(3):133-139, March 1973. 45 refs.*

To improve the dust separation efficiency of electrostatic precipitators, the operating voltage is kept as close to the limiting voltage as possible. Transductors and thyristors can also improve efficiency. The object of shaping the corona discharge wires is to generate a sufficient charge and by selecting suitable material, to ensure long life. Secondary flows and the degree of turbulence can be reduced by gas distribution devices in the diffusor and by suitably developed flow channels. The collecting electrodes are shaped to reduce the return current. This can be achieved in the case of dry cleaning by dead points in the flow by a low degree of loosening the separated dust layer and by the optimum intervals and intensity of rapping. The electrostatic dust collection under extreme conditions, such as temperatures to 800 C and pressures to 500 N/sq cm, is usually tested with an experimental precipitator. Such conditions prevail in pulverized coal operated gas turbines, in gas-cooled nuclear reactors, and in some chemical processes. For ventilation and air conditioning, the two-stage arrangement is used if electrostatic precipitators are installed. Electrostatic precipitators cannot yet be calculated in advance. Construction and development is based on existing and/or experimental units.

28280 **APTIC NO. 50379**

Berbig, Erhard and Manfred Born

CHARACTERIZATION OF COAL DUSTS BY DETERMINATION OF THE DENSITY DISTRIBUTION AND BY MICROSCOPE DETERMINATION OF THE SHAPE. *(Charakterisierung von Kohlenstaeuben durch Dichtetrennung und mikroskopische Bemusterung). Text in German. Freiberger Forschungsh. A, no. 518:107-131, 1972. 17 refs.*

At the gasification of soft coal, dust is emitted which has a limiting influence on the capacity of the plant. In order to take adequate preventive measures, the density distribution and the shape of the dust developing at the pressure gasification was determined and compared with the crude material used for briquetting. The fly dust from two plants was examined. The first kind of fly dust had an average density of 1.713 g/cu cm. Only 0.7% had a density of less than 1.25 g/cu cm, i.e., the fraction of xylite from the crude material which gets into the fly dust is low. About 20% of the quantity had a density of more than 2.0 g/cu cm. These heavy particles consisted primarily of pure quartz grains. The fly dust from the Boehlen plant had an average density of 1.520 g/cu cm. The quantity of particles with a density of more than 2.0 g/cu cm was only half as high as that of the first fly dust. A comparison of the fly ash with the coal dusts shows that the former have higher densities. This can be explained by the fact that during the dwelling time of the dusts in the generator, the largest part of light resins and waxes is driven off, while only the pure coal substance including the ash components remains. The morphological examinations permitted the classification of the dust particles into basic shapes.

28281 **APTIC NO. 50374**

Boznanski, A.

HYDROGEN SULPHIDE REMOVAL FROM GAS IN THE 20 YEAR WORK OF THE CENTRAL LABOARATORY OF GAS ENGINEERING. *(Oczyszczanie gazu od siarkowodoru w dwudziestoletnich pracach Centralnego Laboratorium Gazownictwa). Text in Polish. Gaz, Woda Tech. Sanit. (Warsaw), 46(12):416-418, 1972. 24 refs.*

A review of both dry and wet procedures for the removal of hydrogen sulfide from effluent gases studied in Poland over the past 20 years is presented. Dry procedures discussed include the use of Bog iron ore and other industrial residues including iron oxides. However, the most appropriate procedure is the one using aniline production-resulting residual sludges, containing 87-89% of ferric oxide (dry weight) on a peat support. Tests performed on an industrial scale indicated that this procedure provides a uniform H2S absorption and sulfide regeneration process. The preparation of aniline production residual sludge-based H2S absorption materials requires no special equipment, and the H2S removal can be performed in the traditional facilities, used in the past for the iron ore procedure. Wet H2S removal procedures were tested on a semiindustrial scale. Experiments were performed with gases resulting from Glover-West furnaces and containing 200 to 380 g. H2S/100 cu m, using oxidating solutions resulting from organic synthesis technologies. Ninety-nine percent removal of H2S was achieved with aqueous sodium carbonate solutions including a sodium salt of Schaeffer acid and ammonia water or hydroquinone and ammonia water, under optimum parameter conditions.

28282 **APTIC NO. 50148**

Brocke, Werner

STATE OF THE ART OF FLUE GAS AND FUEL DESULFURIZATION - PROS AND CONS. *(Stand der Technik der Rauchgas- und Brennstoffentschwfelung - Pro und Kontra). Text in German. Luftverunreinigung, 1972: 13-22, Dec. 1972. 11 refs.*

Neither flue gas nor fuel desulfurization are profitable processes. In West Germany, the Technical Directives for the Maintenance of Clean Air are the legal basis for demanding protective measures. They demand that new plants be licensed only if they are equipped with latest state-of-the-art facilities for limiting and distributing emissions. The industry and experts of the Landesanstalt fuer Immissions-und Bodennutzungsschutz (LIB) have a different interpretation of the term latest state-of-the-art. The industry holds the opinion that the desulfurization methods could be state-of-the-art if tested successfully in full-size experimental plants under the same technical conditions that will exist in practice. Successful experiments including acceptable scale-up factor yield the state-of-the-art. This difference of opinions became particularly apparent in connection with the discussion of the question of the applicability of Grillo AGS flue gas desulfurization method for large power plants. While the industry denies the applicability of the process, the LIB affirmed it. The opinion held by LIB meanwhile received support from the U. S. and Japan where several plants between 100 and 700 MW are either in operation or under construction. The situation is similar in the field of desulfurization of liquid fuels. Several plants are in existence in Japan already and Japan wants to double the capacity. West Germany has none because of the opposition by the industry which claims the available methods are not latest state-of-the-art.

28283 **APTIC NO. 50011**

Eyzat, P. and X. Lys

DIESEL ENGINE AND THE ENVIRONMENT. *(Le moteur Diesel et l environnement). Text in French. Entropie, 8(48):117-129, Nov.-Dec. 1972. 6 refs.*

Means of abating emissions from diesel engines are described. Nitric oxide emissions, considerably lower for prechamber diesels than for a direct injection engine, are dependent on temperature, reaction time, and available oxygen concentration. Admission of water vapor with the combustion air helps reduce NO, carbon monoxide, and smoke emissions considerably, at the expense, however, of increased unburned hydrocarbon emissions. Recirculation of uncooled exhaust is also suitable for abating NO, CO, and smoke emissions without considerably affecting engine output. Both the CO and hydrocarbon emissions, determined by available oxygen concentration, gas temperature, and reaction time, are highest at minimum and maximum loads. These emissions can be influenced by adequate injection control. There is so far no practical possiblilty to use catalytic reactors for diesel engines. Thus, modification of the combustion chamber appears to be the most promising way of reducing diesel exhaust emissions. Diesel engines should be optimized for an integrated set of parameters, such as engine performance, pollution, noise, and odor.

28284 **APTIC NO. 50247**

Gompf, Henry L.

EVALUATION OF THE MAGNA FLASH IGNITION CONTROL SYSTEM ON A 1971 VEGA. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-11, APTD-1395, 4p., Feb. 1972.*

The exhaust emission characteristics of a car equipped with an ignition control system were studied to determine the effect of this modification on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The Magna-Flash device had no positive or negative effects on exhaust emissions.

28285 **APTIC NO. 50248**

Gompf, Henry L.

EVALUATION OF STARGAS FUEL ADDITIVE. *Office of Air Programs, Test and Evaluation Barnch, Rept. 72-10, APTD-1394, 8p., Feb. 1972.*

The exhaust emission characteristics of passenger cars fueld by a gasoline-Stargas fuel additive mixture were studied to determine the effects of the fuel additive on driveability and emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. Emission data became somewhat erratic after mileage accumulation. One vehicle effected reductions in CO accompanied by increases in hydrocarbons and NOx emissions. Emissions of the other car increased throughout. Both vehicles suffered deterioration of driveability.

28286 **APTIC NO. 50251**

Gompf, Henry, L.

EVALUATION OF THE BERG EMISSION CONTROL SYSTEM. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-9, APTD-1393, 7p., Jan. 1972.*

The exhaust emission characteristics of a passenger car equipped with the Berg system were studied to determine the effect of the modifications on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The Berg system in essence, is a simple air bleed device: depending on the quantity of additional air sent into the intake manifold, the system reduces hydrocarbon and CO levles. Maximum reduction of 29% and 64%, respectively, were achieved; leaner combustion increased NOx emissions. The Berg system also supplies fuel vapors from the gasoline tank to the intake manifold.

28287 **APTIC NO. 50265**

Gompf, Henry L.

EVALUATION OF A DUAL-CHAMBER, SPARK-IGNITION, TWO-STROKE ENGINE. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-12, APTD-1396, 6p., March 1972.*

The exhaust emission characteristics of a dual-chamber spark-ignition two-stroke engine with a modified fuel injection system and spark ignition system and equipped with a catalytic converter were studied to determine the effect of these modifications on emission levels of hydrocarbons, carbon dioxide, carbon monoxide, and nitrogen oxides. The CO level was slightly higher than that allowed by the 1975-1976 standards; NOx levels were well below the 1976 levels; but the hydrocarbon levels significantly exceeded current Federal standards.

28288 **APTIC NO. 50351**

Graeff, Bruno

AIR CONDITIONING AND ENVIRONMENT. *(Klimatisierung und Umwelt). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e.V., Reutlingen (West Germany), INTHERM, Int. Fachmesse Oelfeuerung Gasfeuerung, 12th, Stuttgart, (West Germany), 1972, p. 57-66. 5 refs.*

Air conditioning provides better indoor climate and cuts out air pollutants in heavily polluted areas. At the same time air conditioners contribute to the thermal pollution of the atmosphere by discharging waste heat. At the moment there are no techniques which would be capable of balancing the thermal load. The only possible way is to use energy as rationally as possible. In this respect air conditioners offer more possibilities than heating systems. As examples may be mentioned the use of illumination and machine heat, heat recuperation by direct heat transfer, and the use of cold machines which are installed in air conditioners as heat pumps.

28289 **APTIC NO. 50141**

Hirao, Osamu and Tsutomu Kato

DEVICE TO REMOVE CARBON MONOXIDE CONTAINED IN AIR OR EXHAUST GAS. *(Kukichu aruiwa haikichu no issankatanso o jokyosuru sochi). Text in Japanese. (Kachita Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-33431. 5p., Aug. 24, 1972. (Appl. Oct. 23, 1968, 1 claim).*

An exhaust catalytic afterburner to remove carbon monoxide from air or automobile exhaust gas is described. The catalyst is composed of natural zeolite, manganese oxide, and copper oxide. To avoid catalyst deterioration with moisture, the catalyst container is rotated so that the portion of the catalyst for the initial treatment of exhaust gas is kept dry.

28290 **APTIC NO. 50120**

Hosho, Yukio and Hisanori Moriya

EXHAUST GAS RECIRCULATION DEVICE. *(Haikigasu kanryu sochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-34424. 5p., Aug. 30, 1972. (Appl. Sept. 2, 1970, 4 claims).*

An exhaust gas recirculation device is described which features a control box which controls the ratio of the recirculating gas to the air intake at the optimum level. The box receives signals from various sensors detecting negative pressure increases, engine revolution, and other factors, and gives off a signal which controls the opening of the electromagnetic valve which admits the exhaust gas. Nitrogen oxides are thus effectively reduced which engine performance deterioration is kept to a low level. An exhaust gas recirculation carburetor is interlocked with the throttle valve of the main carburetor.

28291 **APTIC NO. 50139**

Hosho, Yukio

EXHAUST GAS RECIRCULATION DEVICE. *(Haikigasu kanryu sochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-34423. 3p., Aug. 30, 1972. (Appl. June 19, 1970, 1 claim).*

An exhaust gas recirculation device is described which controls the quantity of exhaust gas to be recirculated and additional fuel to be mixed with the exhaust gas so that the air/fuel ratio is kept constant with varying engine operating conditions so that engine performance does not deteriorate. When recirculated exhaust gas amounts to 15% of the air/fuel mixture, nitrogen oxides can be effectively reduced while minimizing engine performance deterioriation. The throttle valve of the main carburetor is linked to the exhaust intake throttle valve so the amount of recirculated exhaust gas is controlled according to the main throttle valve opening. Additional fuel can be taken in according to the amount of recirculated exhausts, thus providing an adequate fuel/air mixture.

28292 **APTIC NO. 50198**

Komoto, Tadao

DEVICE TO PREVENT ENVIRONMENTAL POLLUTION CAUSED BY EXHAUST GAS. *(Haikigasu no kogaiboshi sochi). Text in Japanese. (Daiwa Sangyo Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 47-29136. 2p., Sept. 1, 1972. (Appl. Aug. 7, 1970).*

A device is described which supplies preheated auxiliary air to the carburetor while automatically controlling the volume of air according to engine speed, thus ensuring the optimum air/fuel ratio to minimize carbon monoxide emissions. When the engine is operated at low speeds, the auxiliary air taken from the air cleaner is warmed and fed into the carburetor through a pipe with small air outlet holes. When the engine is operated at higher speeds, the flow pressure is higher, and a control valve is opened; then air is fed through both a pipe with small holes and a pipe with large holes.

28293 **APTIC NO. 50289**

Knop, Wilhelm

EMISSION SOURCES AND MEASURES FOR CLEAN AIR MAINTENANCE IN SLAUGHTERHOUSES. *(Emissionsquellen und Massnahmen zur Luftreinhaltung in Tierkoerperbeseitigungsanstalten). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(9):259-264, Sept. 1972. 14 refs.*

Emission problems and pollution control in animal waste processing plants are reviewed. Most malodorous emissions originate in cookers and driers when opened, and from meat meal storage facilities. Immediate processing of all animal wastes and slaughterhouse by-products constitutes the simplest way to minimize odorous emissions. If immediate processing is not possible, the animal waste should be stored in cool space until processing. Shops should be permanently kept under a slight vacuum, and suction devices should be used for cookers. Washing of the waste gases is possible only if the malodorous components react with the wash liquid. Wash towers with a column filled with dolomite, limestone, or other alkaline earth carbonate, and water spray in counterflow to the waste gases are the most suitable washers. Chlorine and chlorine dioxide, used as oxidizing agents, form hypochlorite and chloride with the lime, and oxidize the malodorous contaminants. Venturi scrubbers have the advantage of producing intense turbulence of the waste gas. Thermal oxidation of the waste gases to carbon dioxide and water is possible at a temperature over 800 C. Catalytic oxidation requires a temperature range of 200-400 C. Cooker and drier emissions can be controlled by spray or surface condensation. The condensate formed should not exceed a temperature of 35 C to prevent secondary odor emissions.

28294 **APTIC NO. 49998**

Kobayashi, Yasuhiro

NEW ELIMINATION METHOD OF HYDROGEN SULFIDE IN LOW PRESSURE GASES. *(Teiatsu gasu chu ni okeru ryukasuiso no atarashii jokyoho). Text in Japanese. Kagaku Kojo (Chem. Factory), 16(11):77-82, Nov. 1972. 2 refs.*

Many methods have been established so far to eliminate hydrogen sulfide, however the problem of the sub-reactions and the regeneration of catalyst remain. A method for the complete elimination of H2S in low pressure gases is discussed. Sodium or kalium ferrate and ferrite in a mixed aqueous solution is used as an absorbent. This process changes the concept of the usual H2S elimination methods by the oxidized steel catalyzer. Ferrous hydride has an extremely low solubility. When the oxidized steel catalyzer is in an aqueous solution, the perimeter of the fixed or hanged oxidized steel becomes saturated very quickly, and it was therefore difficult to keep the iron ion concentration high. In this process the high soluble iron concentration is used as a means of the mechanical agitator for smooth oxidation reaction and sodium ferrate itself accelerates the absorption and regeneration as a strong oxidizer. In the absorbent solution there exist no H2S ion. The H2S balance pressure can be zero and the sub-reaction can be controlled. The absorbent is harmless and nonvolatile. A special catalyzer is not necessary in the present process.

28295 **APTIC NO. 50149**

Kunstein, E.

MAINTENANCE OF CLEAN AIR IN THE MINERAL OIL INDUSTRY - STATE OF THE AIR AND FUTURE DEVELOPMENT. *(Luftreinhaltung in der Mineraloelindustrie - Stand der Technik und kuenftige Entwicklung). Text in German. Luftverunreinigung, 1972:23-30, Dec. 1972. 14 refs.*

Three levels must be distinguished in the mineral oil industry as far as progress of protection against air pollution is concerned. On the first level there are the plants constructed in the late sixties which have some facilities for the limitation of emissions. On the next level are those plants which were licensed only if the latest state-of-the-art air pollutant cleaning facilities were installed. On the third level there are plants which are still under construction and which will keep the emission of air pollutants below the standard emission limit values. By the end of the sixties the off-gas from the safety valves was in most cases burned in flares. The refinery products were filled into tank trucks or ships without any protective measures against air pollution which means that the air displaced from the tanks was allowed to disperse into the atmosphere with all pollutants it carried along. Floating roof storage tanks were widely in use. In some cases the emission of sulfur dioxide was limited or the use of low-sulfur fuel was demanded. The measures which will gain importance in future will include the cleaning of the waste gases from the catalyst regeneration station to a residual carbon and soot concentration of 75 mg/cu m, the widespread use of fuel with sulfur concentration of only 0.5% limitation of the dust and soot emissions from firing systems of refineries to 75 mg/cu m, the use of dust collectors for the process of soot blowing and the erection of Claus plants with 99% efficiency.

28296 **APTIC NO. 50194**

Matsudo, Ryoji

DISPOSAL DEVICE FOR STACK GAS DISCHARGED FROM CHIMNEY. (Entotsu no haikigasu shorisochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-31708. 2p., Sept. 25, 1972. 4 refs. (Appl. Dec. 29, 1967).

A stack gas disposal device is described which is attached to the top of a stack. Mounted on the supporting frame or rods erected upright from the receiving pan is an umbrella-like cover, under which an air spray nozzle blows air downward. Water pipes run outside of, and parallel to the supporting frames, but within the receiving pan. The receiving pan is equipped with a drainage pipe through which the dust and scrubbing water is discharged. A cross-bar spans the supporting frames; from it a stack-cleaning brush is hung which can be moved up or down. A chimney cover is provided above the brush to cover the chimney during cleaning with the brush. A wire net circles the supporting frames and another net circles the water pipes. The space between the two wire nets serves as a scrubbing chamber. Water sprays connected to the top ends of the water pipes scrub the stack gas. Dust and water are collected in the receiving pan. The smoke can be sucked back through the air pipe and nozzle for recombustion.

28297 **APTIC NO. 50188**

Matsumoto, Tokuichi

INTERNAL COMBUSTION ENGINE EQUIPPED WITH EXHAUST GAS CLEANER. *(Haikigasu jokasochi o yusuru nainenkikan). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-29134. 2p., Sept. 1, 1972. (Appl. July 31, 1970).*

This device was designed to ensure the easy engine start-up even in a cold area and to prevent afterburn and emission of combustibles when the key switch is turned off. Generally, part of the exhaust gas is likely to remain in the combustion chamber as well as in the exhaust gas cleaner of the engine when the key switch is turned off. When the engine is used in a cold area, vapors generated from this remaining exhaust gas freeze, making the engine start-up characteristically poor. According to the invention, the intake pipe with a venturi and a throttle valve is connected to the air cleaner above and the engine below. A thermal reactor is connected to the exhaust port of the engine. The top end of the fuel channel from the carburetor opens in the intake pipe at the height where the throttle valve is located. This top end of the fuel channel is divided into the slow and idle ports. An air channel connects the fuel channel to the air cleaner side of the intake pipe. The air channel is opened and closed by an electromagnetic valve consisting of a needle valve, a solenoid, and other components. When the key switch is turned off, the ignition circuit of the engine is turned off while the electromagnetic valve is opened through action of the solenoid at the same time, thus causing air of the air channel to be fed into the intake pipe through both the idle and slow ports. This completely stops the fuel feed into the intake port from the carburetor, while the exhaust gas remaining in the combustion chamber and the reactor is diluted with air taken in from the intake pipe, thus avoiding afterburn. When the engine is cooled from outside in a cold area, the hot exhaust gas remaining in the engine or the reactor may be discharged through the air channel and the air cleaner.

28298 **APTIC NO. 50327**

Matsumoto, Tokuichi

INTERNAL COMBUSTION ENGINE EQUIPPED WITH EXHAUST GAS CLEANER. *(Haikigasu jokasochi o yusuru nainenkikan). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-29135. 3p., Sept. 1, 1972. (Appl. July 31, 1970).*

When an engine equipped with a catalytic or thermal afterburner is braked, combustible gas can be emitted into the exhaust system, resulting in an explosion of the gas (afterburn) as it is burned with the overheated exhaust gas cleaner. A device is described which prevents afterburn and increased emissions of combustible gas during deceleration. It has a special air channel to make the fuel channel leading to the slow or idle port directly exposed to air from the afterburner. This channel has an electromagnetic valve which allows the air to enter the fuel channel. Another switch is turned off by the negative pressure of the intake pipe when the engine is braked to open the ignition circuit and the electromagnetic valve so combustible gas concentration is lowered and afterburn eliminated.

28299 **APTIC NO. 50197**

Matsuwake, Fusaura, Kenzo Isa, and Korezo Minami

MULTI-STACK CHIMNEY. *(Shuen entotsu). Text in Japanese. (Hitachi Shipbuilding and Engineering Co., Ltd., Osaka (Japan)) Japan. Pat. Sho 47-29627. 3p., Sept. 5, 1972. (Appl. Feb. 15, 1965).*

Greater diffusion of smoke or stack gas can be achieved by collected stack gases from several boilers in a thermal power plant and discharging them through one chimney, a multi-stack chimney, or placing the individual stacks as close together as possible. However, when several stacks are placed together and tied together, heat stress problems can occur which adversely affect the structure when one of the boilers is not operating. A solution to this problem is outlined which consists of making stacks semicircular so that two stacks form an oval when placed together. The flat sides of the two semicircular portions facing each other are attached by ribs and a joint which allows an up-down sliding. When one stack is discharging smoke and the other is not, the one in use can be expanded vertically without affecting the other. The two stacks can also be placed much closer to each other than two circular stacks.

28300 **APTIC NO. 50192**

Moriya, Hisanori

EXHAUST GAS RECYCLING DEVICE. *(Haikigasu kanryusochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47-34727. 3p., Sept. 1, 1972. (Appl. Sept. 11, 1970, 1 claim).*

The best reduction of nitrogen oxides during exhaust gas recirculation occurs when 10% of the air intake volume is exhaust gas. One automatic control system controls the recycling exhaust volume by volume control valve linked with the throttle valve of the carburetor so that the former can be opened according to the opening of the latter. However, back pressure can affect the system enough to result in recycling improper exhaust gas volumes. This invention solves the back pressure problem in the control valve-throttle valve system by modifying the conventional exhaust gas recirculation system. An automatic pressure adjuster device is installed before the recycling volume control valve in the exhaust gas recycling pipe. The pressure adjuster device is an eccentric valve mounted on an eccentric shaft; a weight is mounted in the opposite direction. When recycling starts, the flow pressure acts on the valve so that the pressure in the space below the eccentric valve decreases. In turn, the weight gives torque in the other direction, the torque increases with increasing the distance the weight moves Thus, the greater the back pressure, the greater the torque. This keeps the pressure below the eccentric valve practically constant.

28301 **APTIC NO. 50328**

Moriya, Hisanori

EXHAUST GAS RECYCLING DEVICE. *(Haikigasu kanryusochi). Text in Japanese. (Hitachi, Ltd., Tokyo (Japan)) Japan. Pat. Sho 47- 34728. 3p., Sept. 1, 1972. (Appl. Sept. 11, 1970, 1 claim).*

An exhaust gas recirculation device is described which solves the problem of back pressure by using a recycling volume control valve linked with the throttle valve of the carburetor for automatic control of exhaust gas volume. The device allows pressure between the pressure adjuster valve and the recycling control value to be maintained at a constant level. Thus a recirculation of 10% of the exhaust gas can be constantly maintained to give the most effective nitrogen oxides reduction.

28302 **APTIC NO. 50111**

Muroki, Takumi and Motoyuki Hayashida

EXHAUST GAS CLEANER FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no haikigasu seijosochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-34422. 4p., Aug. 30, 1972. 1 ref. (Appl. Oct. 8, 1969, 2 claims).*

The normal exhaust gas recirculation system to reduce nitrogen oxides emitted by internal combustion engines recirculates the exhaust gas regardless of operating conditions. Therefore, fuel combustion can be adversely affected during idling or decelerating when NOx emissions are negligible. A new recirculation system is discussed in which the exhaust gas is recirculated to the intake air/fuel mixture according to engine operating conditions, thus reducing the formation of carbon monoxide and avoiding deterioration of engine performance. The negative pressure control device is controlled by temperature changes of the cooling water and exhaust gas; it causes negative pressure in the pipe leading recirculating exhausts back to the intake area when the throttle valve opening is very large or small (indicating idling or deceleration), and thus reduces or stops recirculation in these operating modes.

28303 **APTIC NO. 50191**

Nakamura, Nobuatsu

DEVICE TO PREVENT EMISSION/SCATTERING OF HARMFUL GAS. *(Yugaigasu hosan boshisochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-34415. 2p., Aug. 30, 1972. (Appl. July 27, 1970, 1 claim).*

A fuel tank of an automobile made of plastic transmits 4.88 g/day of hydrocarbon vapors from the gasoline at 26.7 C. This volume increases by 60% for each 10 C. In a rubber filler hose, 750 g/sq m at 25 C for 96 hr is evaporated. A device is described which prevents emissions of vaporized gasoline from fuel system components made of any material likely to transmit the vapors. The hose, tank, or other engine parts can be wrapped with a special tape made of cellophane, cloth, or vinyl coated with an absorbent such as activated carbon, silica gel, or alumina on the inside. A tubular engine part can be covered with a corrugated plastic strip coated with an absorbent on the inside.

28304 **APTIC NO. 50140**

Nanbu, Shuya

FUEL CONTROL DEVICE FOR AFTERBURNER. *(Afutabana no nenryo seigyosochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-32854. 5p., Aug. 22, 1972. (Appl. Dec. 28, 1970, 1 claim).*

A computerized fuel control device to control the amount of secondary fuel fed into an automobile afterburner is described. The electronic fuel control system gives more freedom in selecting the place of installation than mechanical systems and permits remote control. The air pump, fuel pump, ignition device, afterburner, and computer are automatically started when the engine starts. The computer generates a pulse signal which opens the valve. The operation circuit detects the opening of the engine throttle valve and sends a signal to the electromagnetic valve which controls the quantity of secondary fuel fed into the afterburner. Secondary air is also controlled according to the opening of the throttle valve.

28305 **APTIC NO. 50350**

Niepenberg, H. P.

INDUSTRIAL FIRING SYSTEMS AND ENVIRONMENT. *(Industriefeuerungen und Umwelt). Text in German. Bundesverband Oelfeuerungen und Gasfeuerungen e.V., Reutlingen (West Germany), INTHERM, Int. Fachmesse Oelfeuerung, Gasfeuerung, 12th, Stuttgart, West Germany, 1972, p. 51-54.*

All fuels contain some quantity of sulfur. Coke oven gases, refinery gases, and natural gas contain the lowest quantities. Their desulfurization is simple and inexpensive. The availability of these fuels is limited so that in future industrial firing systems will continue to use coal and heavy and light fuel oils. Desulfurization and an optimal operation of the furnaces by controlling the combustion chamber temperature, the air surplus, and waste gas return will be necessary, as well as waste gas cleaning.

28306 **APTIC NO. 50178**

Ohta, Nobuto

CHEMICAL TECHNOLOGY FOR POLLUTION CONTROL. *(Kogai to kagaku gijutsu). Text in Japanese. Yuki Gosei Kagaku Kyokai-Shi (J. Soc. Org. Syn. Chem.), 30(353):17-23, Dec. 1972.*

A general discussion is given of the control techniques of air pollution, water pollution, and solid wastes. The major air pollutants are sulfur oxides from the combustion of heavy oil, carbon monoxide, nitrogen oxides, and hydrocarbons from automotive exhaust gas, offensive odors from paper and pulp mills and marine product manufacturers, and dusts from iron refineries, cement industries, and ore combustion. The sulfur dioxide in flue gas is usually removed by wet processes which utilize an alkali solution to absorb the SO2 and recover it as sulfite, or by dry processes which use solid substances to absorb or adsorb the SO2. Sulfur in heavy oil can be removed by direct desulfurization and indirect desulfurization. In the latter process, heavy oil is distilled, and the distillate is desulfurized and mixed with the residues. Many devices have been produced to minimize CO in automotive exhaust gas. These include afterburners, catalytic mufflers, rotary engines, steam engines, and gas turbines.

28307 **APTIC NO. 58362**

Roman, Jan

MODERN EQUIPMENT AND TECHNOLOGICAL PROCESSES APPLIED IN THE PAPER-MANUFACTURING INDUSTRIES IN SWEDEN. *(Nowoczesne wyposazemie i procesy technologiczne w przedsiebiorstwach przemysw celulozowo - papierniczego Szwecji). Text in Polish. Przegl. Papier., 28(10):349, 351, 353, 355, 357, 1972.*

A review of the Swedish paper manufacturing industry procedures including environmental control measures is presented. Air pollution control is provided for by using electrofilters at the soda regeneration level, to achieve a 96% purification of the related effluents. Further purification (up to 99.5%) is achieved by gas scrubbers using pure sodium hydroxide solutions for the removal of sulfurous compounds. Effluent gases of the pulp and paper industries in Sweden carry 1.0 to 3.0 mg/cu m of hydrogen sulfide and 30 mg/cu m of dust, against the standards of 10-15 mg/cu m and 500 mg/cu m, respectively.

28308 **APTIC NO. 50150**

Schade, Horst

STEEL PRODUCTION WITHOUT EMISSIONS - A STEEL OF TOMORROW? (Stahlerzeugung ohne Emissionen - Ein Stahlwerk von morgen)? Text in German. Luftverunreinigung, 1972:30-32, Dec. 1972.

The advance of the electric arc furnace in the steel production in the last few years has increased dust and noise emissions.

To eliminate the dust emission, all measures under development concentrate on the complete withdrawal of all waste gases from the arc furnace. A second possibility, is dust removal by a combination of direct drawing off of gas, withdrawal on the electrode openings and the furnace door with a side-drafthood, and hood exhaustion for the charging and casting process. This combination was installed for the first time in a new steel plant which has been in operation for half a year. The problem of hood exhausting in general has not yet been solved satisfactorily, since residual gas escapes into the workshop. The gained results cannot entirely be transferred to other new steel plants since the emissions depend largely on the product and thus on the raw material and the mode of operation. For fine dust collection, 1000 bag filters of synthetic fiber are now used. The coarse dust is separated in a cyclone. The cleaned gas has a residual dust concentration of less than 10 mg/cu m.

28309 **APTIC NO. 50154**

Sieth, Joachim

INCINERATION: AN AIR POLLUTION PROBLEM? WAYS OF REDUCING HYDROGEN CHLORIDE EMISSIONS. *(Muellverbrennung: Ein Luftreinhalteproblem? Wege zur Minderung der Chlorwasserstoff-Emissionen). Text in German. Luftverunreinigung, 1972:43-51, Dec. 1972. 11 refs.*

In incinerators of West Germany, no measures are generally taken against the gaseous emissions. The incinerators are equipped with electrostatic precipitators which remove the dust from the off-gases. Measurements of the gaseous emissions from incinerators yielded a hydrogen chloride concentration of 1 g/cu m, sulfur dioxide 0.6 g/cu m, and hydrogen fluoride 10 mg/cu m. The concentration of HCl is so high that a stack incrementation is necessary. In order to give an idea of the required stack incrementation at an increase of the presently valid maximum allowable average emission value from 2 g to 2.5 g/cu m, diagrams are given in which the stack height isohypses are plotted in dependence of the waste gas volume flow, temperature, and maximum emission concentration. The needed stack height is 177 m with a waste gas flow of 300,000 cu m/hr, a maximum hourly average concentration of 2 g HCl/cu m, and a waste gas temperature of 200 C. Independent of increasing the stack height of incinerators, other measures must be taken to reduce the gaseous pollutants. They comprise the actual reduction of the pollutant, the processing of the obtained reaction products, and the disposal of the obtained waste product by dumping, discharge into the sewer, or chemical-technical recycling. A cost calculation for the installation of an electrostatic precipitator for dust removal with HCl absorption and neutralization and evaporation of the scrubbing water yielded operating costs of $.54/ton of waste. Scrubbers are very suitable for the removal of the gaseous pollutants in incinerator off-gases.

28310 **APTIC NO. 50027**

Strauss, Hans-Jochen

AN APPROXIMATION FOR DETERMINATION OF FLOW FIELDS OF EXHAUST HOODS. *(Ueber eine Naeherung zur Bestimmung von Stroemungsfeldern von Absaugehauben). Text in German. Staub, Reinhaltung Luft, 33(3):142-146, March 1973. 8 refs. (Presented at the Internationale Staubtagung, Bonn-Bad Godesberg, West Germany, 1972.)*

The suction from a simple hood can be a potential flow. From the properties of a potential flow it is possible to derive data on suction flow and the symmetrical properties, given by the superposition theorem of the velocity potential. By the reflection of the hood aperture which may be represented as an inclined plane at walls limited by the flow, it is also possible to express the flow pictures of complicated arrangements of hoods which are in themselves simple. The relation between the volume of suction flow and the velocity generated at the working place is considered from this point of view.

28311 **APTIC NO. 50189**

Taketomi, Akira

AFTERBURN PREVENTION DEVICE FOR INTERNAL COMBUSTION ENGINE EQUIPPED WITH EXHAUST GAS PURIFICATION REACTOR. *(Haikigasu jokahannoki o yusuru nainenkikan no afutabaan boshiosochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-29133. 2p., Sept. 1, 1972. (Appl. Jul 18, 1970).*

An internal combustion engine equipped with a thermal reactor for exhaust gas purification is subject to frequent afterburns (combustion of exhaust gas accompanied by an explosion). An ignition switch with a delay circuit that keeps the ignition circuit on for a period of time even after the ignition is turned off was designed to prevent these afterburns. The device also includes an electromagnetic valve that operates when the ignition switch is turned off and an air feed valve that is opened by the negative pressure of the intake pipe which are interlocked to prevent afterburns. When the ignition switch is turned off, electricity stored in the capacitor is discharged to keep the ignition system operating. Then the electromagnetic valve opens which opens the air feed valve, and air is fed into the intake pipe until the engine comes to a complete halt. Therefore, the air/fuel mixture gives a combustible ratio even at this stage, and is effectively burned in the combustion chamber of the engine to prevent the gas from being fed into the reactor causing afterburns.

28312 **APTIC NO. 50199**

Tanaka, Hisashi

ELECTRODE PLATE FOR ELECTROSTATIC PRECIPITATOR. *(Denkishujinki yo denkyokuban). Text in Japanese. (Toa Kosan Co., Ltd., Yokohama (Japan)) Japan. Pat. Sho 47-31017. 2p., Sept. 18, 1972. (Appl. Jan. 29, 1970).*

Generally, dust particulates are charged positively and collected by the negative plate in electrostatic precipitation. However, occasional removal of the accumulated dust from the negative plate is necessary to maintain dust-collecting efficiency, so the plate is washed with water or a cleaning solution. Since dust contains greasy or tar particulates, it is difficult to remove the accumulated plates. To make dust removal easier, a new electrode plate was developed, coated with Teflon. The non-adhesive nature of the Teflon coating makes it easier to remove the accumulated dust. The coating also gives good heat resistance and mechanical strength for longer life.

28313 **APTIC NO. 50142**

Tatsutomi, Yasuo and Shigetake Yoshimura

EXHAUST GAS CLEANER DEVICE FOR AUTOMOBILE ENGINE. *(Jidosha enjin no haikigasu jokasochi). Text in Japanese. (Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Japan. Pat. Sho 47-32855. 5p., Aug. 22, 1972. (Appl. Jan. 14, 1970, 1 claim).*

An automobile exhaust gas cleaner features a new air intake system to control primary and secondary combustion air according to engine operating conditions. At normal speed, automotive exhaust pollutants are usually effectively eliminated by an afterburner or other exhaust cleaner. But at deceleration an inadequate air/fuel mixture enters the cylinders because air intake during deceleration is proportionally limited, but the fuel intake is not. This results in more pollution or combustion of the exhaust accompanied by an explosion. The new air intake system features a valve which is opened and closed by negative pressure in the inlet manifold. It feeds primary air into the manifold only when the engine is decelerating.

28314 **APTIC NO. 50193**

Tatsutomi, Yasuo and Tetsuro Noma

DEVICE TO PREVENT EMISSION INTO ATMOSPHERE OF VAPORIZED FUEL. *(Johatsunenryo no taiki-hoshutsu boshisochi). Text in Japanese. (Toyo Kogyo Co., Ltd.,* *Hiroshima (Japan)) Japan. Pat. Sho 47-31727. 2p., Aug. 15, 1972. 2 refs. (Appl. Sept. 24, 1969, 1 claim).*

An arrangement of the condenser tank, crankcase, and canister is described which prevents emission of vaporized gasoline by eliminating valves. The fuel tank is connected by a pipeline to a condensor which is connected to the crankcase, which is connected to a canister packed with activated carbon or another absorbent to absorb the gasoline vapors. When the engine is not operating, most of the gasoline vapor is condensed in the condenser tank and is returned to the fuel tank as a liquid. The remainder of the vapor goes to the crankcase to be held. Vapors not held by the crankcase and vapor evaporating from the carburetor flow into the canister where they are absorbed. When the engine is operating, fresh air enters the canister because of negative pressure in the inlet manifold; it desorbs the gasoline vapor from the absorbent. The desorbed vapor is led into the inlet manifold through the crankcase, the ventilation pipe, and the ventilation valve, and is finally led into the engine for combustion.

28315 **APTIC NO. 50190**

Tochiori, Yoshikazu

POWDER AND DUST KNOCK OFF DEVICE. *(Funtai oyobi dasuto no datsuraku sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 47-31171. 4p., Sept. 19, 1972. 1 ref. (Appl. Jan. 20, 1969).*

Transport pipes and containers handling cement and other powder materials or gas ducts and flues handling dusty gases can become clogged with the powder and dust accumulated on their walls. Conventional methods used to remove the accumulated powder or dust from these walls are either to knock it off by hammering or vibrating the walls from outside or to whisk it off by means of a pointed rod. Since such powder and dust are almost invariably moisture absorbing, they stick to the walls, especially when the temperature drops below the dew point, in which case it is almost impossible to remove them by means of hammering and/or vibration. So, in many cases, the whole plant has to stop operation in order to remove the accumulated powder or dust. The new powder/dust knock-off device was designed for easier removal of such accumulated powder or dust. A number of rectangular boards are hung by means of ring hangers from the internal walls of the pipes, dusts, or containers. They are provided in a particular section or sections of the walls where the powder or dust is more likely to accumulate. Each rectangular board is connected to the vibrator outside by means of a rod inserted through a hole in the wall. When the powder or dust is accumulated until the boards are buried in it, the boards are then hammered or vibrated in a synchronized or unsynchronized motion, using the connecting or link rod and the vibrator. This effectively removes the accumulated powder or dust from the walls.

28316 **APTIC NO. 50151**

Welzel, K.

POSSIBILITIES OF WASTE GAS CLEANING IN SECONDARY ALUMINUM AND COPPER ALLOY PLANTS. *(Moeglichkeiten der Abgasreinigung in Aluminiumumschmelz- und Kupferlegierungsumschmelzwerken). Text in German. Luftverunreinigung, 1972:33-36, Dec. 1972. 5 refs.*

The uncleaned waste gas from secondary aluminum plants has a particulate concentration of up to 2 g/cu m. The main components of the dust are alkali chlorides (65 to 90%), aluminum oxide (1-2%), iron oxide (3%), and potassium fluoride (2%). In addition the dust contains alkaline earth chloride and silicates. The waste gas contains sulfur dioxide, sulfur trioxide, hydrogen chloride, and fluoride. The dust in the waste gas from secondary copper alloy plants contains copper (3 to 10 wt%), tin (50 to 70%) and lead (0.5 to 1 wt%). In addition, cadmium and small concentrations of alkali and earth alkali metals are present. For removal of dusts from the waste gases, filters have proved to be quite suitable. For cooling the waste gases to a temperature which can be tolerated by the filter material, an indirect cooler is used. For brass recast plants, the envelope cloth filter is suitable. Adequate preliminary separators must be installed though.

28317 **APTIC NO. 50153**

Winkler, Hans-Dieter

PROGRESSIVE MEASURES AGAINST AIR POLLUTION IN THE CHIPBOARD INDUSTRY. *(Fortschrittliche Luftreinhaltemassnahmen in der Spanplattenindustrie). Text in German. Luftverunreinigung, 1972:37-42, Dec. 1972. 2 refs.*

The emissions from the various manufacturing stages of chipboard manufacturing are described. The conventional production method transports the wet chips from the chip producing machine to the storage bunker pneumatically. Dust is emitted here. For dust removal a cyclone is used after the pneumatic transport system. With it a residual dust concentration of 50 mg/cu m can be achieved with proper maintenance of the cyclone. The emissions can be largely avoided by using enclosed mechanical drag chain conveyors. An exception is the waste air from the chip producing machine which is produced in quantities of 3000 to 5000 cu m/hr. This waste air must be drawn off and cleaned in a cloth filter. The vapors coming from the drier also carry a considerable amount of dust. These waste gases contain water vapor, resins, and etheric oils, which are commonly cleaned in large cyclones. Dust concentrations between 300 and 600 mg/cu m and peak concentrations of 2000 mg/cu m are measured in the cleaned gas. Better results are achieved with a high quality wet collectors. A multicyclone group is presently being tested with these waste gases. It is expected that a dust concentration of 150 mg/cu m can be achieved. For the dry part of the chipboard manufacture, closed ring systems can be used for material transport. Some chipboard manufacturing plants have already been equipped with mechanical transportation systems, ring systems, and cloth filters with the result that the dust concentration was nowhere more than 75 mg/cu m.

1971

28318 **APTIC NO. 50266**

Austin, Thomas C.

EXHAUST EMISSIONS FROM THE LAFORCE FALCON. *Office of Air Programs, Test and Evaluation Branch, Rept. 72-13, APTD-1397, 5p., Dec. 1971.*

The exhaust emission characteristics of a passenger car with various modifications, including carburetor replacements, exhaust manifold insulation, and venturis, were studied to determine the effect of the modifications on emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The LaForce vehicle effected emission reductions sufficient to meet the 1972 standards, but the emission levels were far above the proposed 1975-1976 levels. The system was also too complicated to be considered as a retrofit package for uncontrolled vehicles.

28319 **APTIC NO. 50268**

Gompf, Henry L.

EXHAUST EMISSIONS FROM TWO PASSENGER VEHICLES EQUIPPED WITH FUMCELL. *Air Pollution Control Office, Div. of Emission Control Technology, Rept. 71-25, APTD-1418, 13p., April 1971.*

The exhaust emission characteristics of two passenger cars equipped with Fumcell devices were studied to determine the effect of the Fumcell on fuel consumption, engine operation, and emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The Fumcell is a small tubular device which is installed in the positive crankcase ventilation (PCV) line with the standard PCV valve left in place.

Hydrocarbon and CO emissions from both cars were substantially reduced by the installation of the Fumcell due to the high vacuum leaning effect. The NOx emissions did not react consistently to the installation of the device. Fuel consumption results ranged from a 9% savings on one car to a 7% penalty on the other car. While the Fumcell was an effective device for leaning vehicular operation, its universal application to a population of vehicles with operating conditions ranging from very rich to very lean is questionable.

28320 **APTIC NO. 58280**

Gompf, Henry L.

EVALUATION OF THE EMISSION REDUCTION WITH THE PERFECT CIRCLE RETRONOX SPEED CONTROLLED EGR SYSTEM. *Office of Air Programs, Mobile Source Pollution Control Program, Rept. 72-8, APTD-1392, 10p., Oct. 1971.*

The exhaust emission characteristics of three passenger cars equipped with the perfect circle retronox exhaust gas recirculation system were studied to determine the effect of the system on driveability and emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The system effected NOx reductions of over 50%, with smaller but consistent reductions in hydrocarbon and CO levels, possibly due to increased air-fuel mixing. Little adverse effect on driveability was determined.

28321 **APTIC NO. 58281**

Gompf, Henry L.

EXHAUST EMISSIONS FROM TWO PASSENGER VEHICLES EQUIPPED WITH THE ADAKS DEVICE. *Environmental Protection Agency, Office of Air Programs, Rept. 72-6, APTD-1390, 5p., Sept. 1971.*

The exhaust emission characteristics of two passenger cars equipped with the ADAKS vacuum breaker were studied to determine the effects of the device on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The ADAKS vacuum breaker is basically an air bleed device to achieve leaner engine combustion. The device was an effective control for the reduction of CO, with a lesser effect on hydrocarbon emissions. Emission levels for NOx and CO_2 however, increased.

28322 **APTIC NO. 58299**

Lowell, Philip S. and Terry B. Parsons

A THEORETICAL STUDY OF NOX ABSORPTION USING AQUEOUS ALKALINE AND DRY SORBENTS. VOL. I. (FINAL REPORT). *Radian Corp., Austin, Tex., Office of Air Programs Contract EHSD 71-5, APTD-1162, 100p., Dec. 31, 1971. 61 refs.*

NTIS: PB 211035

A study was undertaken to develop a theoretical description of alkaline scrubbing processes for removing nitric oxide and nitrogen dioxide from electric utility plant flue gases. The important chemical species present in nitrogen oxide/water systems and the reactions they undergo in the sorption process were defined. An equilibrium model was developed so that concentrations of gas-phase NOx species could be calculated under specified conditions of temperature, total pressure, and chemical composition (total moles of NO, NO_2, and H_20). Calculations performed with the equilibrium model indicated that vapor film limited diffusion of nitrous acid and nitric acid is the mechanism for NOx sorption from flue gases. Liquid film limited sorption of NO_2 may also be important in the mechanism. Sorption data analysis, using the proposed mechanisms, gave results which agreed with experimental findings. Thermodynamic data on sorption reactions were used to screen metal oxide sorbents for wet for dry NOx removal processes based on formation of a solid metal nitrate or nitrite and sorbent regeneration. Suitable sorbents for an aqueous process involving nitrite formation are the oxides of silver, barium, calcium, lithium, sodium, potassium, lead, and strontium. With the exception of PbO and Ag_2O, the same oxides are suitable for dry processes. All the above oxides plus cesium oxide would be suitable for both dry and aqueous processes based on nitrate formation. In addition, the oxides of cadmium, cerium, manganese, magnesium, and zirconium are candidates for aqueous nitrate-forming processes.

28323 **APTIC NO. 58257**

Thomson, John C.

AN EVALUATION OF THE EMISSIONS CHARACTERISTICS OF THE ESSO WELL MIXED THERMAL REACTOR. *Environmental Protection Agency, Office of Air Programs, Rept. 72-3, APTD-1387, 6p., Aug. 1971.*

The exhaust emission characteristics of a passenger car equipped with an advanced emission control system were studied to determine the effect of the modifications on emission levels of hydrocarbons, carbon monoxide, carbon dioxide, and nitrogen oxides. The system included fuel rich carburetion, exhaust gas recirculation, and spark retardation for the control of NOx and a thermal reactor to control CO and hydrocarbons. The system met all standards through 1974 with a potential for meeting the 1975 proposed standards. To meet the 1976 standards, additional controls for NOx are required.

28324 **APTIC NO. 58267**

Verrelli, Leonard D.

EXHAUST EMISSIONS FROM A PASSENGER CAR WITH GASOLINE TREATED WITH BYCOSIN FUEL ADDITIVE. *Air Pollution Control Office, Div. of Emission Control Technology, Rept. 71-24, APTD-1419, 6p., April 1971.*

The exhaust emission characteristics of a passenger car fueled with a gasoline-Bycosin fuel additive mixture were studied to determine the effects of the fuel additive on engine operation and emission levels of hydrocarbons, carbon monoxide, and nitrogen oxides. The results from the driving tests were inconsistent and therefore inconclusive. Under the conditions of the 1970 Federal test procedures and the constant volume tests, HC and CO levels increased while NOx levels decreased. During steady state conditions, HC and CO levels decreased while NOx levels increased considerably at all speeds.

28325 **APTIC NO. 58286**

Watanabe, Shoji

FUNCTIONS OF COMPLEX SALT-TYPE ADDITIVES IN HEAVY FUEL OIL COMBUSTION. *(Juyu nensho ni okeru sakuen-kei tenkazai no sayo). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 38(4):329-344, 1971. 16 refs.*

Barium petroleum sulfonate, which was prepared from sodium petroleum sulfonate, spindle oil, and barium chloride solution and had a barium content of about 30% and a molecular weight of about 1000, was dispersed into heavy fuel oil. The heavy fuel oil was supplied to a combustion chamber and the sulfur oxide and particulate concentrations in the flue gas were measured. The SOx was analyzed by the neutralization method, detector tube method, conductivity method, and p-rosaniline method, and particulate was analyzed by a dust tube. The addition of 0.2%(v/v) of the barium complex salt decreased up to 50% of the sulfur dioxide in flue gas, and the particulate concentration was also remarkably reduced. The sludge condensation in the oil storage tank and in pipelines were reduced.

1970

28326 **APTIC NO. 50245**

Thomson, John C.

A REPORT ON THE EXHAUST EMISSIONS OF AN ARMY M-151 1/4 TON TRUCK USING AN EXHAUST CATALYST. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-13, APTD-1429, 5p., Dec. 1970.*

The exhaust emission characteristics of an Army truck were tested before and after the installation of a catalytic exhaust reactor to determine the effect of the device on emissions of carbon monoxide, hydrocarbons, carbon dioxide, and nitrogen oxides. In the truck equipped with the reactor, unburned hydrocarbons decreased 22%, CO increased 15%, and NOx decreased 41%.

28327 **APTIC NO. 50246**

Thomson, John C.

EXHAUST EMISSIONS FROM A VEHICLE EQUIPPED WITH THE ROBERTS INDUCTION MODIFICATION SUPPLIED UNDER CONTRACT CPA 70-51. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-14, APTD-1428, 7p., Dec. 1970.*

The exhaust emission characteristics of a car equipped with a modified system consisting of changes to the intake manifold, lean main jets in the carburetor, and revised camshaft were studied to determine the effect of the system on performance and on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The system had no significant effect on hydrocarbon or CO emissions, reduced NOx emissions by about 27%, and had a small detrimental effect on performance at high loads.

28328 **APTIC NO. 50252**

Thomson, John C.

EXHAUST EMISSIONS FROM A PASSENGER AUTOMOBILE EQUIPPED WITH ELECTRONIC FUEL INJECTION. *National Air Pollution Control Administration, Div. of Motor Vehicle Research and Development, Rept. 71-12, APTD-1430, 5p., Dec. 1970.*

The exhaust emission characteristics of a passenger car equipped with an electronic fuel injection system were studied to determine the effect of the device on emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The vehicle failed to meet either the 1970 or the 1972 emissions standards. The NOx concentration was relatively low, although still not below the proposed 1975 standard of 0.9 g/mi. Overall performance and driveability were also adversely affected.

28329 **APTIC NO. 50253**

Thomson, John C.

EXHAUST EMISSIONS FROM A PASSENGER CAR EQUIPPED WITH A UNIVERSAL OIL PRODUCTS CATALYTIC CONVERTER. *Air Pollution Control Office, Div. of Motor Vehicle Research and Development, Rept. 71-16, APTD-1426, 6p., Dec. 1970.*

The exhaust emission characteristics of a passenger car equipped with a catalytic reactor and electronic fuel injection were studied to determine the effect of the system on engine performance and emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The car failed to meet the 1975 exhaust emission standards; driveability was acceptable.

28330 **APTIC NO. 50264**

Thomson, John C.

EXHAUST EMISSION FROM PASSENGER AUTOMOBILES EQUIPPED WITH DOUGHBOY CARBURETORS. *Air Pollution Control Office, Div. of Motor Vehicle Research and Development, Rept. 71-15, APTD-1427, 5p., Dec. 1970.*

The exhaust emission characteristics of passenger cars equipped with experimental carburetors and an exhaust gas recirculation system were studied to determine the effects of the modifications on engine performance, fuel economy, and emissions of carbon monoxide, carbon dioxide, hydrocarbons, and nitrogen oxides. The cars failed to meet any of the emission standards, and driveability was only marginal. Unburned hydrocarbons were considerably reduced when the standard carburetor was installed.

1969

28331 **APTIC NO. 50300**

Knop, W.

MAINTAINING CLEAN AIR IN NONFERROUS METAL OPERATIONS. PART III. TECHNICAL MEASURES FOR MAINTAINING PURITY OF THE AIR. *Metall (Berlin), 23(2):182-189, 1969. 44 refs. Translated from German by R. Gregg Mansfield, Oak Ridge National Lab., Tenn., Office of Language Services, 27p., Dec. 1971.*

NTIS: ORNL TR 2549

Devices for purifying exhaust air or off-gases of nonferrous metal operations can be classified into dry separators and wet separators. The most important dry separators are the gravity separator, inertial separator, centrifugal separator, cloth filter, electrostatic precipitator, and absorber (e.g., activated carbon). Wet separators range from relatively simple washing towers and annular slot washers to the most effective group, venturi scrubbers. The operation, costs, and applications of dry and wet devices are reviewed. The electrostatic precipitator is the most expensive dust remover. However, its energy requirement is low and precipitators can be constructed for any degree of dust removal. To ensure maintenance of limiting values for clean gas, some industries use only electrostatic precipitators for many emission sources. In copper ore processing plants, they are thus used for reduction of emissions and as a final cleanup on the roasting and sintering plants, shaft furnaces, and copper matte furnaces. The applicability of wet separators is limited by the wettability of the substances to be removed and by the fact that these substances can contain no material which reacts with the scrubbing agent. Washing towers are used by the copper and aluminum industries. Annular slot washers have proved effective in hot galvanizing plants and in plants where molten light metals are chlorinated.

1961

28332 **APTIC NO. 50238**

Teverovskii, B. Z.

PRIMARY CLEANING OF BLAST-FURNACE GAS BY CENTRIFUGAL DUST EXTRACTORS. *Izv. Vysshikh. Uchebn. Zavedenii Chernaya Met., 4(3):16-22, March 1961. Translated from Russian. Henry Brutcher Technical Translations, Altadena, Calif., 11p., 1962.*

A slot-type centrifugal dust extractor for the preliminary dry cleaning of blast furnace top gases without lowering the gas pressure or temperature as it enters a gas turbine was studied to determine optimum design and operating characteristics. The effect of the dust content of the air stream, the volume of air led off with the dust, air flow rate, particle shape, and slot length of the degree of collected dust was investigated. With dust particle sizes of 0.053-0.075 mm, 94% collecting efficiency was effected. For optimum design, the trapping slot length should be not less than half the circumference of the spiral part of the installation.

1959

28333 **APTIC NO. 58237**

Baum, K.

THE WASTE GAS PROBLEM IN OXYGEN-STEEL PRODUCTION, ESPECIALLY THE LD PROCESS. *Berg Huettenmaenn. Monatsh., 104(2):41-50, 1959. 3 refs. Translated from German. Henry Brutcher Technical Translations, Altadena, Calif., 25p., 1959.*

The basic principles of oxygen steel production and waste gas treatment for steelmaking furnaces are reviewed. Using a venturi scrubber, 98.5-99.5% precipitation efficiency was achieved with extremely finely divided mists and aerosols. Waste gas treatment techniques for the desiliconizing process and the LD process; direct hot quenching of the waste gases; partial indirect cooling methods; indirect cooling with full waste heat recovery; sludge treatment; and iron oxide recovery processes are also reviewed.

28334 **APTIC NO. 58272**

Harr, R., K. Wagner, and T. -H. Willmer

DUST REMOVAL PLANT AT THE BOCHUMER VEREIN LD STEELWORKS. *Berg-Huettenmaenn. Monatsh., 104(2):50-55, 1959. Translated from German. Henry Brutcher Technical Translations, Altadena, Calif., 13p.*

To reduce the visual color of waste gases from two 34-ton LD crucibles, a German steelworks installed a dust removal plant consisting of a Pease-Anthany saturator, a venturi tube in which waste gases are washed with recycled water, and a separator. Coarse dust down to 0.06 mm is trapped in the saturator, while fine dust under 0.06 mm is trapped in the venturi tube. About 15-20% of all dust is removed in the saturator and 80-85% in the venturi tube. Coarse material is combined with slime water from the separator and pumped to a thickener. The thickened slime is filtered in rotating drum filters to obtain filter cakes containing high-grade ore suitable for input to a blast furnace. Preclarified water from the thickener is passed to settling ponds prior to recycle to the venturi tube and saturator. Purified waste gases contain less than 150 mg dust/cu m, and particle size averages less than 0.25 micron. The capital cost of the dust removal plant was about $904,000.

28335 **APTIC NO. 58273**

Rasworschegg, H.

WASTE HEAT BOILER SYSTEMS AND GAS CLEANING PLANTS DOWNSTREAM OF LD VESSELS AND CONVERTERS. *Berg-Huettenmaenn. Monatsh., 104(2):31-40, 1959. Translated from German. Henry Brutcher Technical Translations, Altadena, Calif., 14p.*

Waste heat boilers downstream of LD oxygen process vessels or bottom-blown converters were originally installed to ensure suitable low outlet temperatures for gas cleaning plants designed for elimination of brown fumes. Many of the boilers have been adjusted to give continuous steam output and now provide the principal power and heat to the steelworks. Boilers in Japanese, Austrian, and German LD installations using wet mechanical dust removal methods alone or in combination with wet electrofilters are described. At 13,300 std cu m gas/heat and 0.35 m ton dust/hr, the dust content of clean gas from one combination mechanical-electrical filter is 86 mg/std cu m, and dust loss is 1.1 kg/heat. Precipitation efficiency is 99.7% and pressure loss is 470 mm of water. The smoke plume is hardly visible.

1950

28336 **APTIC NO. 58296**

Pryar, Robert Marshall

AN INVESTIGATION OF AEROSOL COAGULATION BY MEANS OF AIR JET GENERATED ULTRASONIC VIBRATIONS. *Purdue Univ., Lafayette, Ind., Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Aug. 1950, 183p. 86 refs.*

Aerosol coagulation was studied by means of air-jet generated ultrasonic vibrations. A review of the present-day methods of air cleaning shows that the combination of the ultrasonic coagulator and the cyclone precipitator has advantages not found in any other method or combination of methods of air cleaning equipment. Settling chambers, bag collectors, scrubbers, cyclones, electrostatic precipitators, and ultrasonic coagulators are discussed. A study of the air-jet ultrasonic generator revealed that when the generator is operated at optimum conditions, it has certain advantages over the siren-type generator in that it produces waves of comparable intensities with higher efficiency, lower weight per unit of power output, greater simplicity of design, and smaller cost of manufacture. At frequencies as low as 12.5 kc/sec, the ultrasonic beam is reflected from solid objects in the same manner as light and with negligible loss, which allows the air-jet generator spherical output to be converted into more applicable plane waves for use in the coagulation process. Methods available to measure the particle sizes of smokes and dusts are reviewed, and particle sizes of common industrial dusts are reviewed. The frequency ranges required for various particle size ranges were studied, and the growth of particle sizes as a result of the action of ultrasonic waves was analyzed. Small size smoke particles may be sufficiently increased in size to be efficiently removed by the cyclone precipitator.

MEASUREMENT METHODS

1973

28337 **APTIC NO. 58824**

Takaishi Municipal Government (Japan)

POLLUTION MONITORING VEHICLES. *(Kogai kansokusha). Text in Japanese. 5p., 1973.*

The pollution monitoring vehicle obtained by the city of Takaishi was equipped with apparatuses for the measurements of air pollutants including sulfur oxides, airborne particulates, oxidants, nitrogen oxides, hydrocarbons, and carbon monoxide. The SOx was measured by the conductivity method. Particulates, oxidants, NOx, HC, and CO were measured by light-scattering spectrophotometric (with neutral potassium iodide solution), colorimetric, hydrogen ionization, and infrared absorption methods, respectively. The vehicle was also equipped with an apparatus for the measurement of meteorological conditions such as wind velocity, wind direction, temperature, and humidity.

28338 **APTIC NO. 58881**

Study Group on Nitrogen Oxide Measurement Methods (Japan)

EVALUATION OF THE ANALYSIS METHODS FOR FLUE GAS NOX. *(Endo-chu no NOx bunsekiho kento kekka). Text in Japanese. Preprint, 13p., Jan. 1973.*

Four analytical methods including chemiluminescence, non-dispersive infrared (NDIR), ultraviolet (UV) and constant-voltage electrolysis were employed to determine nitrogen oxides in stack gas. The sample gas was collected by several samplers from the same stack, and for comparison, the gas was also analyzed by a JIS standard method, the Saltzman (naphthylethylenediamine) method. The change of concentration during a period of 5 days was consistent for the chemiluminescence, NDIR, and UV methods. However, the NOx concentration measured by the chemiluminescent method was always about 10 to 20 ppm lower than that from the other two methods. The results obtained by the JIS standard method were closer to that of NDIR and UV methods.

28339 **APTIC NO. 50092**

DATA ACQUISITION SYSTEM. APPLICATION TO AIR AND WATER QUALITY SURVEILLANCE NETWORKS. *(Systeme d acquisition de donnees. Application aux ensembles de controle de la qualite de l air et de l eau). Text in French. Tech. Moderne, 65(2):36-37, Feb. 1973.*

An autonomous, automatic data acquistion system especially suitable for collecting and transmitting water and air quality monitoring data, is described. The equipment includes an analog incremental recorder and an analog-digital converter. The signals recorded on nine-track tape with a combined capacity of 540,000 words, sufficient for operation over several months. A separate sampler is able to take samples over 5, 10, 15, or 30 min. The system may include a teletransmission equipment for data transmission to data processing centers. This system, able to monitor up to 12 different parameters, can be used for monitoring the water quality in water bodies, by measuring water temperature, dissolved oxygen, turbidity, nitrogen, water level, solar radiation, pH value, and electric conductivity. The automatic data acquisition system can be also incorporated in meteorological stations where it automatically measures and records solar radiation, air temperature, and wind speed and direction.

28340 **APTIC NO. 50063**

Angerer, J., D. Szadkowski, A. Manz, R. Pett, and G. Lehnart

OCCUPATIONAL CHRONIC EXPOSURE TO ORGANIC SOLVENTS. I. GAS CHROMATOGRAPHIC DETERMINATION OF BENZENE AND TOLUENE IN AIR AND IN THE VAPOUR PHASE OF BLOOD SAMPLES. *(Chronische Loesungsmittelbelastung am Arbeitsplatz. I. Gaschromatographische Bestimmung von Benzol und Toluol in der Luft und im Dampfraum von Blutproben). Text in German. Int. Arch. Arbeitsmed., vol. 31:1-8, 1973. 10 refs.*

To determine the effect of chronic exposure to organic solvents in occupationally exposed workers, xenometabolically produced substances can be measured. The organic solvents can be measured in biological materials such as blood; however these methods are too insensitive to detect lower concentrations. Gas chromatographic methods for determining benzene and toluene in the air and in blood are presented. The total retention time for benzene is 1.2 min, that of toluene is 2.0 min. Neither substance has a disturbing background in the gas chromatograms. The accuracy expressed at the recovery is 100%. The precision of 4.1% is satisfactory. The detection limits for the two solvents are very low in both air and blood, so the method is suitable for the health supervision of low exposures.

28341 **APTIC NO. 50213**

Breuer, Hans

DEVELOPMENTS TO THE GRAVIMETRIC DUST MEASUREMENT METHOD. *(Entwicklungen zum gravimetrischen Staubmessverfahren). Text in German. Glueckauf (Essen), 109(7):390-395, March 1973. 20 refs.*

With the available gravimetric fine dust measuring units of various design and for various applications, the fraction of respirable fine dust can be better determined than with the tyndalloscope used to date. The inaccuracy of the tyndalloscope primarily in the particle size range below 1 micron has long been known. New methods are therefore being developed. The prototype of a dust photometer has now been completed. The unit has a measurement angle of the scattering light of 70 deg instead of 30 deg with the tyndalloscope. The primary light has a wavelength of about 0.9 micron instead of white light. The measurement values are indicated in digits. Gravimetric dust measuring units can also be used. They usually have a cyclone for preliminary dust separation. The fine dust is removed by some untis by a second cyclone or by a rotating porous synthetic filter. They are simpler and determine the respirable dust fraction better than the tyndalloscope.

28342 **APTIC NO. 50053**

Coenen, Wilfried

A NEW MEASUREMENT METHOD FOR EVALUATING FIBROUS DUST ON WORKING PLACES. *(Ein neues Messverfahren zur Beurteilung fibrogener Staeube am Arbeitsplatz). Text in German. Staub, Reinhaltung Luft, 33(3):99-103, March 1973. 12 refs.*

A method for measuring the mass concentration of fine dust consists of an impactor which separates dust on a diaphragm filter using particle reflection. The air flow of the sampler is controlled electronically. The mass is determined on the diaphragm filter by beta-absorption. A filter box is used to carry the measuring filter and samples. The new method was investigated in a laboratory and in the field. The method can be used to test respirable dust in working areas. The air throughput of the sampler is 20 cu m/hr, the standard deviation smaller than 3%. For maintaining the above air flow, the maximum permitted pressure loss at the filter is 550 mm water. The dust-laden air enters from the top through the nozzle and distributes in the preliminary separator. The dust is separated on the filter. The dust-free air flows around a thermistor and leaves at the bottom. Depending on the air velocity, the thermistor supplies an analogue signal which is used for the automatic regulation of the blower.

28343 **APTIC NO. 50155**

Glogg, Peter

COMPUTERIZED MONITORING OF THE SULFUR DIOXIDE CONCENTRATION OF THE AIR IN FRICKTAL. *(Computerisierte Ueberwachung des Schwefeldioxidgehaltes der Luft im Fricktal). Text in German. Gesundheitstech., 7(1):14-15, 1973.*

In Fricktal, Switzerland, the sulfur dioxide concentration of the atmosphere is monitored by nine stationary and one mobile measuring stations. Two further stations measure meteorological data. All data are transmitted to a computer via hired telephone lines. It transmits signals to the SO2 monitors via the telephone system, processes data, and presents data in a standard form. The computer also determines the influence of location, time, season, and wind direction on the measured concentrations. The measuring stations are equipped with SO2 monitors operating according to the principle of continuous coulometric titration.

28344 **APTIC NO. 50103**

Ke, P. J. and R. J. Thibert

ANTICATALYTIC MICRODETERMINATION OF MERCURY USING CERIUM-ARSENITE REACTION. *Mikrochim. Acta, no. 1:15-24, 1973. 21 refs.*

An anticatalytic kinetic method, based on the decreased rate of reaction between cerium(IV) and arsenic(III), was developed for the determination of mercury and was tested experimentally. The change in reaction rate due to inhibition by mercury was measured spectrophotometrically at 275 nm. Reaction conditions and interference of foreign ions is discussed. Amounts of mercury in the range of 0.04-0.20 micrograms were determined with an overall error of less than 5% at a reaction time of 25 min. This method can be used to determine mercury in air, water, or biological samples.

28345 APTIC NO. 50016

Krishnan Nambisan, P. N. and C. G. Ramachandran Nair

MICRODETERMINATION OF CADMIUM: AN IMPROVED TITRIMETRIC PROCEDURE OF THE RULFS-PRZYBYLOWICZ-SKINNER METHOD. *Mikrochim. Acta, 1973(2):331-336, 1973. 14 refs.*

Cadmium can be precipitated as bis-thiourea cadmium (II) reineckate, according to the Rulfs-Przybylowicz-Skinner method. The precipitate can be oxidized by chloramine-T, whereby 80 equivalents of the oxidant are consumed per mole of the complex salt, i.e., per mole of Cd. A titrimetric micromethod for determining Cd is based on this reaction. The method is highly selective; zinc does not interfere; of all the common cations, only bismuth, copper, mercury, lead, and antimony interfere. Small amounts (as low as 0.3 mg) of Cd may be determined.

28346 APTIC NO. 50068

Lacaze, P.

DEVELOPMENT AND CONSTRUCTION OF A HIGH-SENSITIVITY CHROMATOGRAPHIC HIGH-FREQUENCY IONIZATION DETECTOR FOR AUTOMATIC INDUSTRIAL GAS ANALYSIS. *(Etude et realisation d un detecteur chromatographique a ionisation par haute frequeace de haute sensibilite pour l analyse industrielle automatique des gaz). Text in French. Chromatographia, 6(1):32-38, Jan. 1973. 21 refs.*

A high-sensitivity chromatographic high-frequency ionization detector for automatic industrial analysis of gases such as helium, oxygen, nitrogen, nitrogen dioxide, nitrous oxide, sulfur dioxide, carbon dioxide, carbon monoxide, ammonia, and saturated and unsaturated hydrocarbons in the ppm range is described. Purified helium or argon as a carrier gas is automatically mixed with the gas to be analyzed, and admitted into chromatographic column with silicagel, a molecular sieve, or activated carbon. The carrier gas is ionized in a cell with two adjustable electrodes by means of a Hartley oscillator supplying 40 W in a frequency range of 5 to 300 MHz. The perturbations produced by the gas to be analyzed passing through the ionization cell induce concentration dependent changes in the output current. This method is applicable for the determination of oxygen and nitrogen impurities in helium, and thus suitable for continuous surveillance of helium production. A second cell that can be used at pressures beyond atmospheric reduced the limits of detection of several industrial gases into the range of 0.01 ppm.

28347 APTIC NO. 50104

Lieser, K. H.

APPLICATION OF RADIOCHEMICAL METHODS IN ENVIRONMENTAL RESEARCH. *(Anwendung radiochemischer Methoden in der Umweltforschung). Text in German. Fresenius Z. Anal. Chem., 263(4):304-307, 1973. (Presented at the Euroanalysis Conference, Heidelberg, West Germany, Aug. 28-Sept. 1, 1972.)*

Activation analysis, dilution analysis, and indicator methods are discussed. Radiochemical methods are highly sensitive and can be used for the analysis of pollutants such as heavy metals, pesticides, detergents, organic solvents, products from the mineral oil industry, and others. For locating a pollution source, the indicator methods are best suitable. The possibility of application of the indicator methods is demonstrated by the example of carbon-14 and tracers which have the greatest importance for environmental research.

28348 APTIC NO. 50160

Maguire B. A., D. Barker, and D. Wake

SIZE-SELECTION CHARACTERISTIC OF THE CYCLONE USED IN THE SIMPEDS 70 MK 2 GRAVIMETRIC DUST SAMPLER. *Staub, Reinhaltung Luft, 33(3):95-98, March 1973. 10 refs.*

SIMPEDS 70MK 2 is the new version of a gravimetric dust sampling instrument. It comes in two parts, a cyclone-size-selector filter unit and a motorized pump unit mounted inside a cover on top of the battery. Dusty air is drawn on at 1.9 l/min and the respirable airborne dust is deposited on a suitable filter installed above the cyclone. Coarse particles fall to the bottom of the cyclone. A smoothing device is used to damp out the pulsation in airflow. The size selection characteristic of the cyclone and the effects of the smoothing device on this characteristic are discussed. For determination of the size-selection characteristic, fluorescein aerosols of a constant size are generated by means of the spinning-disc aerosol generator and the percentage penetration through the cyclone is measured. By varying the size of the concentration of fluorescein in the solution fed to the generator it is possible to vary the size of the aerosols. A diagramatic layout of the spinning-disc aerosol generator is given. In practice a range of particle sizes can be obtained by varying the percentage of fluorescein from about 5% down to 0.01%; this corresponds to a range of particle size from about 9 micron down about 1 micron; the angular velocity of the disc is kept constant at 90,000 rpm. A theoretical method is given for determination of the size of the fluorescein aerosols. Additionally, the actual size is determined in each experiment microscopically. If a suitable smoothing device is used, the size-selection characteristic of the production version of SIMPEDS straddles the theoretical elutriation curve and is similar to the elutriation characteristic of the MRE Gravimetric Dust Sampler Type 113A.

28349 APTIC NO. 50093

Ohno, S., M. Suzuki, M. Kadota, and M. Yatazawa

DETERMINATION OF TRACE FLUORINE IN BIOLOGICAL MATERIALS BY PHOTONUCLEAR ACTIVATION ANALYSIS. *Mikrochim. Acta, no. 1:61-68, 1973. 9 refs.*

A photonulclear activation techniques was tested for measuring fluorine in air, water, and biological materials. After alkali fusion, fluorine was absorbed on an anion exhange resin. The irradiated resin was soaked and stirred in 5 N hydrochloric acid solution. After filtering, fluorine-18 resulting from the reaction was extracted with 0.2% dimethyldichlorosilane in xylene, and the fluorine-18 0.51 MeV annihilation peak in an aliquot of the organic phase was measured by gamma-ray spectrometry. The precision of this method calculated from replicate analyses of standard specimen was + or 11%, and sensitivity was 0.01 micrograms for this element.

28350 APTIC NO. 50342

Ortner, G.

A SIMPLE STANDARD APPARATUS FOR THE DETERMINATION OF LOOSELY BOUND ORGANIC, SULFUR-CONTAINING GROUPS. *(Einfache Standardapparatur zur analytischen Bestimmung von schwefelhaltigen organischen Gruppen). Text in German. GIT (Glas-Instrum.-Tech.) Fachz. Lab., 17(2):96-99, Feb. 1973. 3 refs.*

A new, simple standard apparatus for the separation and determination of gases, gaseous mixtures, and low-boiling organic compounds, and especially of sulfur-containing groups, is described. The apparatus, specifically designed for the determination of dithiocarbamates, thiuram, dithiocarbamate-copper oxychloride mixtures and xanthogenates, is suitable for exact determination of such gaseous mixtures as hydrogen-sulfide-carbon disulfide, hydrogen sulfide-carbon disulfide-methyl iodide, hydrocyanic acid-nitrous acid, hydrogen sulfide-sulfur dioxide, and sulfur dioxide-carbon dioxide by means of adequate absorbent solutions. The apparatus is composed of separation flask with reflux cooler, circulating absorber, another temperature controlled absorber, and safety absorbers in the form of bubble counters. Nitrogen or air are used as carrier gas, while the respective absorbent solutions used for absorption of H2S, CS2, CH3I, nitric oxide or nitrogen dioxide, hydrocyanic acid, and ammonia are cadmium acetate-ethanol, potassium hydroxide in methanol, neutral silver nitrate, sulfanilic acid, sodium hydroxide, and hydrochloric acid. The carrier gas flow rate should be maintained below 15 l/hr for quantitative absorption of the gases liberated.

28351 **APTIC NO. 50184**

Suzuki, Shin, Nobutoshi Horiuchi, Tetsuo Enomoto, and Yoshihiro Asano

INVESTIGATION OF ACROLEIN MEASUREMENT BY USING 4-HEXYLRESORCINOL. *(4-hexylresorcinol-ho-ni yoru akurorein no sokuteiho ni kansuru kenkyu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 671, 1973. (Presented at the Japan Chemical Society, Spring Meeting 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D28.)*

The analytical method for measuring acrolein in the atmosphere using 4-hexylresorcinol is discussed. Since the calibration curve of optical density against acrolein concentration differed depending on the order of addition of reagents (96% ethanol, 3% mercury chloride-ethanol solution, 4-hexylresorcinol, and saturated trichloroacetic acid) to acrolein standard solution, preparation of the absorbent must be done carefully. The effects of temperature and aging time on light emission intensity from the sample were checked. Since exposure of the absorbent to natural or artificial light affected the light emission intensity from the acrolein sample, the absorbent should be prepared in a dark room.

28352 **APTIC NO. 50355**

Watanabe, Yukio

GHOST PEAK IN GAS CHROMATOGRAPHIC ANALYSIS OF AIR. *(Kankyo taiki no gasu kuromatoguramu jo ni shutsugenshi, nicchu yakan de zogen suru piiku nitsuite). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 669, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D26.)*

An unknown peak which increased in the daytime but decreased at night was observed in gas chromatographic analysis of gaseous hydrocarbons in the air in the summer of 1970. The peak height changed depending on analytical conditions, for example, cleanliness of the sampler, time interval between sampling and analysis, and exposure to sunlight or phosphorescence light. When the sample was obtained at 77 K by a trap connected to the gas chromatograph directly, the peak did not appear on the chart. The peak might be assigned to a product from organic contaminants in the sampler decomposed by ultraviolet irradiation.

1972

28353 **APTIC NO. 50086**

Kanagawa-Prefecture Center for Public Nuisance Control (Japan) and Kanagawa Prefecture (Japan), Industrial Lab.

EXPERIMENTAL STUDY ON SAMPLING POINTS FOR MEASUREMENT OF THE DUST CONCENTRATION IN FLUE GAS IN A HORIZONTAL, STRAIGHT PIPE FLUE DUCT. *(Suihei chokkan endonai haigasuchu no baijinnodo sokutei ni okeru shirvosaishuten no iikkenteki kento). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:141-146, Feb. 1972. 11 refs.*

The Japanese standard for measuring dust in flue gas flowing through a flue pipe requires four measurements which causes sampling difficulty. It is not possible to sample all points simultaneously, thus a truly representative dust concentration cannot be obtained. A model flue with six sampling points was used to study sampling and to simplify the sampling process. Horizontal and vertical distributions of the dust were measured. It was possible to estimate the dust concentration distribution in a given section from the dust concentration at one sampling point. Thus, fewer sampling points will be needed if they are located properly.

28354 **APTIC NO. 50172**

Yokohama National Univ. (Japan Faculty of Engineering)

STUDY ON SPEEDY QUANTITATIVE DETERMINATION OF VINYL CHLORIDE BY MEANS OF A DETECTION TUBE AT THE SOURCE OF AIR POLLUTION. *(Taiki osengen ni okeru enkabiniru no kenchikan ni yoru zinsoku teiryoho no kenkyu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst., Kanagawa Prefecture), no. 14:152-159, Feb. 1972. 10 refs.*

The detection tube method has been developed to give a speedy quantitative determination of vinyl chloride monomer vapor. When vinyl chloride of 0-500 ppm enters a reaction tube filled with silica gel having absorbed high-concentration sulfuric acid and an oxidizing agent (85% lead dioxide and 15% lead nitrate), chlorine and nitrogen dioxide are produced in a 1:2-1:5 ratio. These gases give the detection agent or silica gel a certain color. A proper combination of ingredients can be used to give an accurate detection tube. With a chlorine detection tube, 0-500 ppm of vinyl chloride could be determined quantitatively. Its accuracy is 100 + or 10 ppm in terms of standard deviation and + or 20% in terms of relative error. A concentration higher than 500 ppm can be determined by dilution prior to analysis. Temperature can affect coloration of the agent, so results must be corrected for temperature.

28355 **APTIC NO. 50079**

Bontemps, P.

PARTICLE SIZE MEASUREMENT WITH THE PI-MC COMPUTER FOR THE COUNTING AND MEASUREMENT OF PARTICLES. *(Mesures granulometrique a l aide de l ordinateur pi MC pour le comptage et la mesure des particles). Text in French. Bull Soc Fr. Ceram., no. 95:77-84, April-June 1972.*

A system for measuring and counting particles deposited on porous membranes is described. Specimens are made on Millipore membranes with pore diameters of 0.8 or 0.45 micron. The apparatus comprises a microscope, a closed-circuit television camera, and a pi-MC computer. The image of the specimen, placed on the microscope base plate, is observed by the television camera, which sends signals to a television receiver and to the computer. The latter comprises a basic module permitting the choice of the method of detection, a counting module for measuring the number of particles contained within the field, a measuring module equipped either for measuring all the particles within the field or for measuring selected particles, and a distribution module which allows cumulative or distributive representation of the results obtained. Control of aerosol particles, particles contained in a liquid, and grain size control of powders are among the possible applications of the measuring apparatus.

28356 **APTIC NO. 50338**

Collis, R. T. H. and E. E. Uthe

MIE SCATTERING TECHNIQUES FOR AIR POLLUTION MEASUREMENT WITH LASERS. *Opto-electron., 4(2):87-99, May 1972. 15 refs.*

The application of lidar techniques to the remote detection of air pollutants was examined. Methods for evaluating lidar observations quantitatively in terms of such physically meaningful parameters as the turbidity, opacity, or particulate mass concentration of smoke plumes or the ambient atmosphere are reviewed. Solutions based on Mie scattering are illustrated with tests on hazy atmospheres, smoke plumes, and controlled aerosols in a test chamber. The basic lidar concept, experimental techniques, and mathematical analyses are reviewed. (Author abstract modified)

28357 **APTIC NO. 50293**

Dimitriades, B., C. J. Raible, and C. A. Wilson

INTERPRETATION OF GAS CHROMATOGRAPHIC SPECTRA IN ROUTINE ANALYSIS OF EXHAUST

HYDROCARBONS. *Bureau of Mines, Bartlesville, Okla., Bartlesville Energy Research Center. RI 7700, 22p., 1972. 5 refs.*

Experiments to refine and to confirm an analytical procedure by which gas-liquid chromatographic spectra are intrepreted from retention time data alone are described. The rationale of this spectra interpretation technique involves whether or not a given peak invariably represents the same component or component mixture; if not, what factors influence changes in peak identifications. Peak identification procedures, based mainly on the use of subtractive columns, were developed and applied to interpret gas-liquid chromatographic spectra of four different engine exhaust samples. For pollution related emission studies, satisfactory interpretation of gas-liquid chromatographic spectra of exhaust and fuels can be accomplished through the use of substractive-column techniques. A comparison of the two different substractive materials used (mercuric sulfate, and mercuric sulfate-palladium sulfate) revealed that the olefin-sensitive mercuric sulfate does not substract quantitatively certain olefins, and causes formation of new products that may interfere with the function of the substractive column. In gas-liquid chromatographic analysis of exhaust from different automobiles, it is not necessary to establish experimentally peak identities for each exhaust spectrum separately, as the same set of peak-identity assignments can be used for all exhaust samples of different automobiles obtained from one fuel.

28358 **APTIC NO. 50179**

Fukazawa, Tsutomu, Momoki, Hirozo, Genzo Hashizume, Hisato Hayashi, Koji Himi, and Seizo Nagasaki

A PANEL DISCUSSION ON POLLUTION AND ANALYTICAL CHEMISTRY, NO. 5: THE ROLE OF X-RAY ANALYSIS. *(Kogai to bunseki kagaku ni kansuru paneru toronkai, (daigokai) x-sen bunseki no yakuwari). Text in Japanese. Bunseki Kogaku (Japan Analyst) (Tokyo), 21(10):1392- 1394, Oct. 1972.*

X-ray analysis has been widely applied in environmental pollution for the detection of pollutants, particularly micro amounts of metals in plants, blood, foods, fuel oils, water, and air. Mineral products in lungs of occupational patients can be successfully detected and analyzed. The mineral products found in the lungs are mostly silica minerals, kaolin minerals, and pyrofelite. The silica minerals including quartz, and tridymite can be easily and accurately analyzed. Iron and lead in the air were deposited on a filter by a vacuum vaporization method followed by non-destructive X-ray analysis. Excellent calibration curves were obtained for 0 to 100 micrograms/cu m of iron and 0-10 micrograms/cu m of lead in air.

28359 **APTIC NO. 50333**

Gelbwachs, J. A., M. Birnbaum, A. W. Tucker, and C. L. Fincher

FLUORESCENCE DETERMINATION OF ATMOSPHERIC NO2. *Opto-electron., 4(2):155-160, May 1972. 12 refs.*

Concentrations of nitrogen dioxide in the atmosphere were determined in real time and with a sensitivity of 1 ppb. Laser excitation of NO2 was at 4416 and 4880 A, and fluorescence was monitored at 0.7-0.8 micron. Results of measurements on typical smoggy days in Los Angeles are presented. The accuracy of the determinations was approximately + or 0.25 pphm, based on measurement statistics and variations in laser output. The absorption and fluorescence mechanisms of NO2, experimental procedures, and calibration methods are reviewed. (Author abstract modified)

28360 **APTIC NO. 50337**

Hinkley, E. D.

TUNABLE INFRA-RED LASERS AND THEIR APPLICATIONS TO AIR POLLUTION MEASUREMENTS. *Opto-electron., 4(2):69-86, May 1972. 26 refs.*

The application of tunable infrared lasers to the detection and monitoring of gaseous air pollutants was examined. The principle of operation, design, and monitoring techniques are reviewed. The various techniques include highly specific point sampling, in situ source monitoring, ambient air monitoring, resonance fluorescence, absorption and remote heterodyne detection. The lasers can be applied to the detection of carbon monoxide, hydrogen chloride, methane, hydrogen fluoride, nitric oxide, carbon dioxide, nitric acid, nitrogen dioxide, sulfur dioxide, hydrogen sulfide, peroxyacetyl nitrate, ozone, nitrous oxide, sulfur trioxide, formaldehyde, benzene, ethylene, and ammonia. (Author abstract modified)

28361 **APTIC NO. 50319**

Inaba, H. and T. Kobayasi

LASER-RAMAN RADAR -- LASER-RAMAN SCATTERING METHODS FOR REMOTE DETECTION AND ANALYSIS OF ATMOSPHERIC POLLUTION. *Opto-electron., 4(2):101-123, May 1972. 45 refs.*

The development, operational principle, experimental system, and applications of the laser-Raman scattering methods for remote detection and analysis of atmospheric pollution are reviewed. A well-designed system can have sufficient sensitivity to monitor the pollutants of medium-level concentration at a range of a few hundred meters. The absolute concentration is evaluated by relating the backscattered intensity for specific pollutants to that for the nitrogen molecule existing in the same atmospheric location. The technique can be applied to the remote detection of such atmospheric pollutants as nitrogen dioxide, sulfur dioxide, carbon dioxide, ethylene, formaldehyde, carbon monoxide, nitric oxide, hydrogen sulfide, and methane. The method was applied to the analysis of ordinary atmospheres, oil smoke plumes, and automobile exhaust gas.

28362 **APTIC NO. 50320**

Lidholt, L. R.

LASER RAMAN RADAR DETECTION BASED ON A SAMPLING TECHNIQUE. *Opto-electron., 4(2):133-139, May 1972. 19 refs.*

The total differential Raman cross section for carbon dioxide, oxygen, carbon monoxide, methane, water, and hydrogen relative to that of nitrogen was studied. The scattered radiation was collected perpendicularly to the excitation beam from a 337.1-nanometer nitrogen laser of 50 kW peak power. The short pulse with a duration of 2.5 ns was conveniently handled by a sampling oscilloscope. The sampling technique permitted a smooth process to be performed at the output of the sampling oscilloscope, which did not affect the time resolution, to improve the signal-to-noise ratio of the records of Raman spectra. (Author abstract modified)

28363 **APTIC NO. 50322**

Measures, Raymond M. and Gilles Pilon

A STUDY OF TUNABLE LASER TECHNIQUES FOR REMOTE MAPPING OF SPECIFIC GASEOUS CONSTITUENTS OF THE ATMOSPHERE. *Opto-electron., 4(2): 141-153, May 1972. 26 refs.*

Three laser methods for the remote mapping of nitrogen dioxide, sulfur dioxide, and iodine were studied and compared theoretically. For NO2, SO2, and I2, differential absorption and scattering had a greater range and sensitivity than laser-induced fluorescence, while for SO2 both techniques were superior to Raman backscattering. However, the sophistication and the difficulty of interpretation associated with Raman scattering indicated that laser-induced fluorescence might be the most suitable technique in a number of situations. In particular, the fluorescence technique was well-suited for the mapping of localized sources of specific molecules in the range of 100-1000 m. Above a certain peak concentration, however, a distortion of the fluorescence return signal could lead to a misinterpretation of both the range and concentration of the source. (Author abstract modified)

28364 **APTIC NO. 50336**

Menzies, Robert T.

REMOTE SENSING WITH INFRA-RED HETERODYNE RADIOMETERS. *Opto-electron., 4(2):179-186, May 1972. 9 refs.*

The application of heterodyne radiometers using lasers to remote pollutant sensing is reviewed. The infrared spectral region of heterodyne techniques is favorable due to the availability of pollutant absorption lines and the wavelength dependence of heterodyne sensitivity. Sensitivity calculations of passive radiometers to nitric oxide, carbon dioxide, and sulfur dioxide are presented. The use of a heterodyne receiver in an active NO sensing system, based on infrared fluorescence, is examined. (Author abstract modified)

28365 **APTIC NO. 50335**

Nakahara, S., K. Ito, S. Ito, A. Fuke, S. Komatsu, H. Inaba, and T. Kobayasi

DETECTION OF SULPHUR DIOXIDE IN STACK PLUME BY LASER RAMAN RADAR. *Opto-electron., 4(2):169-177, May 1972. 11 refs. (Presented at the IEEE/OSA Conference on Laser Engineering and Applications, Washington, D. C., June 1971, Paper 19-2.)*

The application of laser Raman radar to the remote sensing of atmospheric pollutants in stack plumes was studied. Design considerations, theoretical sensitivity and principle of operation, and experimental procedures and results are reviewed. The combination of the second harmonic of an Nd:YAG laser, a synchronous single photoelectron counting scheme, and a narrow passband interference filter employed for the light source, a signal processor, and separation of Raman-scattered light was the most sensitive system for stack effluent monitoring. Using a laser Raman radar constructed on the basis of this combination, the concentration of sulfur dioxide in a plume emitted from a 150-meter high stack of a power plant was measured at a distance of 228 m. (Author abstract modified)

28366 **APTIC NO. 50305**

Oddo, N

APPLICATIONS OF ATOMIC ABSORPTION SPECTROPHOTOMETRY IN THE ANALYSIS OF POLLUTANT ELEMENTS. *(Applicazioni della spectrofotometria di assorbimento atomico all analisi di elementi inquinanti). Text in Italian. Chim. Ind. (Milan), 54(11):1009-1011, Nov. 1972. 9 refs. (Presented at the Giornate Dello Chimica Meeting, 23rd, Milan, Italy, April 19-20, 1972.)*

A graphite tube atomizer substituting for the flame in atomic absorption spectrophotometry and allowing direct air contaminant determination of the sampling filter is presented. The graphite tube is 8 cm long and has a 6 mm diameter. Air samples amounting to 700 l are passed through a filter 490 sq mm in surface area. The filter is then divided into aliquots which are introduced into the graphite tube, subjected to appropriate thermal treatment (electric resistance-generated heat) and fast peaks are obtained. The latter are then compared to data obtained with standard solutions. The procedure was applied to urban air samples in Torino for vanadium determinations at the end of Dec. 1971. Vanadium ranged from 0.19 through 0.37 micrograms/cu m in air samples collected at noon and evenings. The procedure is recommended for lead, chromium, manganese, copper, and zinc.

28367 **APTIC NO. 50028**

Puetz, M., H. D. Wolf, and H. J. Muche

FIRST EXPERIENCES WITH THE EMISSION MONITORING CAR OF A LARGE STATE INDUSTRIAL INSPECTION AGENCY. *(Erste Erfahrungen mit dem Immissionsschutz-Messwagen eines grossen Staatlichen Gewerbeaufsichtsarates). Text in German. Luftverunreinigung, 1972:42-43, Dec. 1972.*

The State Inspection Bureau of Dortmund has had an emission monitoring car in operation for one year. It is used in the industrial center of the Eastern Ruhr area particularly in the cities Dortmund, Bochum, Castrop-Rauxel, Henne, Wanne-Eickel, Wattenscheid, Witten, und Luenen. It monitors the emissions from industrial plants and checks whether the limit values are exceeded. The weather conditions are also monitored. The mobile station is in operation day and night throughout the week. In 850 cases of complaints the mobile station was used to investigate the charges and inacceptable emissions of noise or dust were eliminated. The number of complaints has gone down since the existence of the mobile station.

28368 **APTIC NO. 50288**

Purdue, Larry J., Richard E. Enrione, Richard J. Thompson, and Barbara A. Bonfield

DETERMINATION OF ORGANIC AND TOTAL LEAD IN THE ATMOSPHERE BY ATOMIC ABSORPTION SPECTROSCOPY. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Div. of Atmospheric Surveillance, 19p., 1972. 6 refs.*

Concentrations of total lead in the atmosphere are determined by passing air through a membrane filter for collecting particulate lead and then through an iodine monochloride solution for collecting organic lead. The lead collected on the membrane filter is determined directly by atomic absorption spectrophotometric analysis of acid extracts of the filters. The lead collected in the iodine monochloride solution is determined by extraction with ammonium pyrrolidine-dithiocarbamate and methyl isobutyl ketone followed by atomic absorption analysis. The minimum amount of organic lead detectable is 0.5 micrograms, for a 2.8 cu m air sample, this corresponds to 0.1 to more than 4.0 micrograms organic lead/cu m of air. The detection limit for particulate lead is 0.4 micrograms lead/cu m. An atmospheric sampling study for organic lead in six cities indicated an average organic lead level of about 0.2 micrograms/cu m. Although this value is close to the detection limit of the method, it was relatively constant for the six cities sampled (Cincinnati, Denver, Washington, D. C., St. Louis, Philadelphia, and Chicago).

28369 **APTIC NO. 50250**

Roessler, Johannes

CONSIDERATIONS AND EXPERIMENTS WITH QUALITATIVE AND QUANTITATIVE LIDAR MEASUREMENTS OF SMOKE PLUMES. *Staub (English translation from German of: Staub, Reinhaltung Luft), 32(10):1-7, Oct. 1972. 24 refs.*

NTIS: TT 72-50021/10

Three techniques for the qualitative and quantitative measurement of smoke plumes using lidar are examined. The principles of operation, application, and practical evaluation methods are reviewed for elastic scattering, Raman scattering, and spectral absorption. The elastic backscattering technique was tested in field measurements and was most suitable for the practical monitoring of smoke plumes. It provides a purely qualitative spatial distribution of the particle concentration and sometimes permits a quantitative conclusion as to the total amount of the discharged particles.

28370 **APTIC NO. 50175**

Schnitzler, H.

ANALYSIS AND EVALUATION OF WASTE GASES BY EMISSION MEASUREMENTS. *(Untersuchung und Bewertung von Abgasen durch Emissionsmessungen). Text in German. Schriftenreihe Ver Wasser Boden- Lufthyg., Berlin, no. 38:235-240, 1972. 5 refs. (Presented at the Conference on Environmental Protection and Public Health*

Service, Berlin-Dahlem, West Germany, March 13-18, 1972.)

Emissions develop during almost all processes involving solid, liquid, or gaseous substances. The Technical Directives for the Maintenance of Clean Air for 1964 demand that all large power plants and heating plants monitor their dust and sulfur dioxide emissions by recording measurement units as soon as they are commercially available. Monitoring of sulfur dioxide emissions has been satisfactorily solved. Recording units for the determination of dust emissions are more problematic. Their accuracy is so low with error margins of + or 20 to 30%. But an inaccurate measuring unit for emission monitoring is better than no instrument at all. The legal regulations concerning dust emissions should rule out the possibility for the emitter to pass with higher emissions by selecting the measuring instrument that suits him. Legislators should demand proof from emitters that their emissions are below the standards. The Bavarian method of attempting to prove that the emitter has exceeded the standards is less recommended.

28371 **APTIC NO. 50334**

Smith, William Hayden

A NEW METHOD FOR THE DETECTION OF RAMAN SCATTERING FROM ATMOSPHERIC POLLUTANTS. *Opto-electron., 4(2):161-167, May 1972. 13 refs.*

The application of the Fabry-Perot interferometer as a periodic filter for the sorting of spectra using the rotational Raman scattering effect to determine low concentrations of impurities in the presence of the major atmospheric constituents was examined. Based on theoretical computations, the parameters of importance in making these measurements and the expected results from this technique are discussed. The major pollutants that can be measured by this technique include nitric oxide and nitrogen dioxide. (Author abstract modified)

28372 **APTIC NO. 50001**

Yoshida, Koichi, Shosuke Koike, Yujiro Tsukamoto, and Kenichi Kokura

EXAMPLES OF EXHAUST GAS MEASUREMENTS IN DRIVING MODE CYCLES OF AUTOMOBILES - A STUDY ON THE CONSTANT VOLUME SAMPLER METHOD. *(Jidosha no saikuru unten ni okeru haikigasu no sokutei rei - CVS shikenho ni kansuru ichikosatsu). Text in Japanese. Preprint, Ministry of Transportation (Japan), Traffic Safety and Nuisance Research Inst. p. 101-107, 1972. (Presented at the Traffic Safety and Nuisance Institute Research Meeting, 2nd, Tokyo, Japan, Nov. 8, 1972.)*

The constant volume sampler (CVS) method for automobile exhaust gas is discussed and emission values obtained in the 10-mode, Los Angeles, 4-mode, and council for European communities driving cycles are given. The emission values obtained by the direct measuring method and the CVS method were 21.7 g/km by the direct method and 21.4 g/km by the CVS method at 500 rpm; 20.9 and 20.6 respectively, at 750 rpm; 22.8 and 21.3 at 1000 rpm; and 21.4 and 20.0 at 1500 rpm. This indicates that there is practically no problem in the measuring accuracy of the CVS method. Effects of interference with the chemiluminescence analyzer the CVS is equipped with were also examined. Hydrogen greatly affected the measured value of nitric oxide. Carbon dioxide also affected NO greatly. When CO2 was 7.7%, the measured value of NO decreased by7%. Values of nitrogen oxides directly measured by chemiluminescence plus non-dispersive infrared analysis and non-dispersive ultraviolet analysis were compared with those measured by the CVS method. The former gave a value lower by 11% than that given by the latter at 40 km/hr driving. The difference was greatest at idling, while there was very little difference between the two methods at the peak of acceleration. Comparative measurements of emissions in different driving modes were also made. The CVS method is practically applicable to measurement of automotive emissions.

1971

28373 **APTIC NO. 50306**

Colacino, M., G. Dalu, G. A. Dalu, and F. M. Vivona

A CONDENSATION NUCLEI COUNTER FOR AIR POLLUTION MEASUREMENTS. *(Contatore di nuclei di condensazione per misure di inquinamento atmosferico). Text in Italian. Geofis. Meteorol., 20(1-2):15-18, 1971. 11 refs.*

A condensation nuclei counter is described which includes a light source, an optical system to concentrate the light beam, and a photocell whose signals are conveyed to a galvanometer or recorder. A chamber in which fog is generated is mounted between the light source and the detector. Measurement of the light beam attenuation which depends on the concentration of the water droplets present in the fog chamber provides the data on the condensation nuclei concentration. Air samples passing through the fog chamber generate an additional attenuation of the light beam intensity and the information read on the instrument can be correlated with the condensation nuclei concentration by use of appropriate calibration tables. The instrument has been developed in both automatic and manual forms. Both instruments were provided satisfactory data when used for the measurement of condensation nuclei concentrations in urban areas and marine regions. Recordings performed with the automated instrument in a certain district in Rome allowed the determination of domestic heating generated emission constituents when comparisons were made on a seasonal basis. Diffusion coefficient measurements were used to deduce the average radius of the condensation nuclei which amounted to 0.04 micron, confirming their domestic heating or automotive traffic origin.

AIR QUALITY MEASUREMENTS

1973

28374 **APTIC NO. 50043**

Ministry of International Trade and Industry (Japan); Hiroshima Municipal Government (Japan); and Kure Municipal Government (Japan)

A PRELIMINARY INVESTIGATION AND REPORT ON THE GENERAL INDUSTRIAL POLLUTION IN THE HIROSHIMA-KURE AREA. *(Hiroshima-ken Kure chiku sangyo kogai sogo jizen chosa hokokusho). Text in Japanese. 50p., Feb. 1973.*

Measurements of sulfur oxide concentrations at more than 20 locations in this district revealed that the sulfur dioxide pollution had decreased from 1970 to 1971. The highest average concentration measured by conductivity method in 1970 was 0.046 ppm at Nakamoto Apts., which was the only location whose SO2 concentration exceeded the environmental standard. Among 18 locations investigated, three locations showed particulate concentrations of 14-18 tons/sq km/mo. All three locations were close to iron refineries. Results of a diffusion experiment and calculations by a wind tunnel experiment using data of plans submitted by factories and meteorological data predicted that, in 1975, high SO2 concentrations of more than 0.20 ppm would appear at two locations, and the highest SO2 concentration would be 0.403 ppm at the old Kure area.

28375 **APTIC NO. 50313**

Research Triangle Inst., Research Triangle Park, N. C., Environmental Studies Center

INVESTIGATION OF HIGH OZONE CONCENTRATION IN THE VICINITY OF GARRET COUNTY, MARYLAND AND PRESTON COUNTY, WEST VIRGINIA. (FINAL REPORT). *Environmental Protection Agency*

Contract 68-02-0624, RTI Proj. 41U-764, EPA-R4-73-019, 115p., Jan. 1973. 15 refs.

NTIS: PB 218540

The source of high ozone concentrations in the vicinity of Garrett County, Maryland and Preston County, West Virginia was investigated in a series of field measurements. Approximately 11% Of the hourly O3 concentrations measured at the Garrett County airport exceeded the 0.08 ppm national air quality standard. In one episode, the standard was exceeded for 26 consecutive hours. The mean hourly O3 concentration for the study period was 0.057 ppm with a maximum hourly concentration of 0.119 ppm. High O3 concentrations persisted through the night, with a nighttime mean of 0.055 ppm. Nitrogen dioxide and non-methane hydrocarbon concentrations were at or near background levels throughout the study period. The high O3 concentrations were a result of O3 transport and were associated with air masses arriving in the area after passing over urban-industrial regions. (Author abstract modified)

28376 **APTIC NO. 50000**

Bulbulyan, M. A. and V. B. Smulevich

AIR POLLUTION IN DRIVER COMPARTMENTS OF AUTOBUSES AND TROLLEY-BUSES. *(Zagryazneniye vozdukha v kabinakh avtobusov i trolleybusov). Text in Russian. Gigiena i Sanit., no. 1:87-89, 1973. 6 refs.*

Benzopyrene, hydrocarbon, carbon monoxide, nitrogen oxide, and gasoline concentrations in the air of driver compartments of 60 buses and trolley-buses currently used in mass transportation in Moscow were determined. All vehicles had driver compartment mounted engines. Samples were taken over 2 hr by 12 V-battery operated samplers. The CO, HC, NOx, and gasoline concentrations were 42.3, 177.2, 1.5 and 166.8 mg/cu m respectively, in the warm season, 56.5, 216, 4.2 and 114.4 mg/cu m in the cold season in buses; 22.1, 128, 2.4, and 89.8 mg/cu m in the warm season, and 11, 64.3, 1.97, and 52.5 mg/cu m respectively, in the cold season in trolley-buses. The benzopyrene concentrations in autobus driver compartments were 6.3-7.5 micrograms/100 cu m in the cold season, and 1.8-3 micrograms/100 cu m in the warm season. The corresponding concentrations in trolley-bus driver compartments were lower. The high pollution level inside autobus driver compartments during the cold season was due to engine emissions with windows usually kept shut. The individual pollutant levels inside trolley-bus driver compartments during the warm season were higher than they are in the cold season, which is due to the highly polluted street air flowing in freely through open windows.

28377 **APTIC NO. 50209**

Frey, Peter

MOST DUST IN DRESDEN. *(Am meisten Staub in Dresden). Text in German. Umwelt (Duesseldorf), 3(2):19-21, 1973.*

The German Democratic Republic has three laws regulating measures against air pollution. The maximum allowable emission concentrations correspond to category I of WHO limit values for air pollutants. A ground-level emission monitoring grid is gradually being erected which included 2000 stationary and mobile stations in 1970. According to dust measurements, the highest dust concentration was measured in the center of Dresden and the industrial area Halle, the lowest on the East Sea coast. The measurements indicate that the dust concentrations in East Germany are somewhat lower than in the Ruhr Area of West Germany. The dust concentration measured in Dresden corresponds to that measured in Essen. The maximum allowable emission concentration of 150 micrograms of dust/cu m was exceeded at almost all measuring stations in the GDR. It was most frequently exceeded in Dresden (46%), followed by Halle (33%), and Cottbus (15.4%). A particular problem in the GDR seems to be the food pollution by air pollutants and the high stomach cancer rate.

28378 **APTIC NO. 50186**

Hayakawa, Morihiko, Toyomasa Kato, and Yoji Naruse

EXAMINATION OF THE ENVIRONMENTAL STANDARD FOR ODORS. *(Akushu busshitsu no kankyo kijun ni tsuite no ichi kosatsu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 668, 1973. (Presented at the Japan Chemical Society, Spring Meeting, 28th, Tokyo, Japan, April 1-5, 1973, Paper 2D25.)*

Hydrogen sulfide was measured continuously around a cellophane factory for 6 mo. The H2S 300 m southeast of a 32-meter high exhaust pipe reached a peak between 11:25 and 11:32 am; the maximum concentration became 100 times larger than concentrations before and after the peak time. During 3.3% of the entire investigation period, the H2S concentration exceeded 5.4 ppb, which is three times the mean concentration. The mean concentration for 6 mo and the maximum values of the mean concentrations for a month, day, hour, 15 min, and 7 min fall on a smooth curve when plotted against time interval. The maximum concentration for 7 min equaled about 100 times the 6-month concentration and the minimum concentration equaled 1/100th of the 6-month concentration.

28379 **APTIC NO. 50030**

Nerot, G.

AIR POLLUTION, SOME GENERAL IDEAS AND A PARTICULAR CASE: PARIS. *(La pollution atmospherique. Quelques idees generales et un cas particulier: Paris). Text in French. Ingenieursblad, 42(5):109-112, March 1, 1973.*

General problems of air pollution and pollution control, and the particular situation of Paris regarding air pollution, pollution monitoring, and related legislation are described. Pollution can be regarded as a consequence of a specific pollutant concentration coinciding with specific dispersion conditions. Pollutant dispersion above big cities is usually secured by a permanently ascending mass of air due to excess heat compared to rural areas. Sulfur dioxide, carbon monoxide, nitrogen oxides, hydrocarbons, and ozone constitute the principal air pollutants in France. The SO2, dust, nitrogen oxide, carbon monoxide, sulfate and sulfuric acid concentrations in Paris are regularly monitored by a network covering the entire city. While Paris is divided into two pollution protection zones, the use of No. 2 fuel oil and of coals with volatile contents exceeding 15% is banned in the entire city. The carbon monoxide emission from vehicle engines is required not to exceed 4.5% at idle. The SO2 and dust concentrations recorded in Paris show a decided downward trend (to about 100 micrograms/cu m of SO2 from 159 micrograms/cu m in 1964, and to about 70 micrograms/cu m of dust from 120 micrograms/ cu m in 1964).

28380 **APTIC NO. 50183**

Yanagisawa, Saburo, Yoshikazu Hashimoto, Shoji Nakamura, and Kikuo Oikawa

INFLUENCE OF AUTOMOBILE ON METAL CONTENTS IN THE ATMOSPHERE. *(Taiki-chu kinzoku seibun no jidosha ni yoru eikyo). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 672, 1973. (Presented at the Japan Chemical Society, Spring Meeting 28th, Tokyo, Japan, Paper 2D29.)*

The influence of motor vehicles on the urban atmosphere was studied by measuring the metals in highway tunnel air and the air over streets in a business district. Although the iron, chromium, nickel, and cadmium concentrations were not especially higher near the highway than in the business district, the lead, manganese, copper, and vanadium concentrations were much higher near the highway. The maximum particle size distribution was 5-7 micron; it decreased to 0.5 micron near the highway. Smaller size particles than those that occurred near the highway were emitted by tires in a laboratory study.

1972

28381 APTIC NO. 50038

Hiroshima Prefectural Hygienic Research Inst. (Japan)

AIR AND NOISE POLLUTION. *(Taiki soonbu). Text in Japanese. In: 1971 Annual Report. p. 156-343, Nov. 1972.*

Investigations were conducted at six areas in Hiroshima where pollution by sulfur oxides and airborne particulates occurred in 1968. The pH, nitrate ion, sulfate ion, and chloride ion of the solutions of benzene-soluble and water-soluble components were also determined. Areas close to a steel refinery, shipbuilding, and chemical plants were highly polluted.

28382 APTIC NO. 50039

Shizuoka Prefectural Government (Japan)

THE WHITE PAPER ON PUBLIC NUISANCE, 1972. *(Kogai hakusho showa 47-nendo). Text in Japanese. p. 12-63, Nov. 1972.*

Measurements of sulfur oxides, at three areas in Fuji in Shizuoka Prefecture showed that the pollution condition was improved from 1968 to 1971. However, at one area where major paper and pulp manufacturers were centered. The SOx concentration in 1971 still exceeded the environmental standard. In the Shimizu area there was also one area where the SOx concentration exceeded the standard in 1969 and 1970 but reached the standard in 1971. Measurements of carbon monoxide, carbon dioxide, nitrogen oxides, and oxidant concentrations at various locations in 1971 revealed that the automotive exhaust had not become the major pollution problem in this Prefecture. A low sulfur plan was enforced, including strict regulations and inspection.

28383 APTIC NO. 50045

Electric Manufacturers Assoc. (Japan)

MEASUREMENTS OF WIDE-AREA AIR POLLUTION BY NITROGEN OXIDES. *(Chisso sankabutsu o shutai to shita taiki osen koiki sokutei kekka ni tsuite). Text in Japanese. 72p., April 1972.*

A simultaneous, wide-area investigation was carried out about environmental pollution at 10 major districts, as well as for environmental pollution distributions near nine major highways throughout the country. The areas chosen for the study were primarily polluted by nitrogen oxides. Results revealed that the average NOx, nitric oxide, nitrogen dioxide, and carbon monoxide concentrations were about four times higher and the average sulfur dioxide concentration was about two times higher than control areas. Intimate relationships were found between the CO and NOx concentrations near major highways, and the relationship between CO and SOx concentrations was not negligible. The results of the wide-area measurements also supported the results of local pollution distributions near the major highways.

28384 APTIC NO. 50089

Kawasaki Municipal Hygiene Lab. (Japan)

RESULTS OF A SURVEY ON THE CONCENTRATION OF SUSPENDED DUST AND METAL COMPONENTS IN KAWASAKI CITY. *(Kawasaki-shi ni okeru fuyufunjin nodo to kinzokuseibun no chosakenyu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:55-57, Feb. 1972.*

From Dec. 1969 to Nov. 1970, suspended dust was continously measured at industrial, commerical, and residential areas of Kawasaki with a hi-vol sampler. Dust concentrations and metal components are tabulated for each area. The highest suspended and settling dust concentration occurred at the industrial region. The average dust concentration was 261 micrograms/cu m for the residential area, 303 micrograms/cu m for the commerical area, and 373 micrograms/cu m for the industrial region. A frequency distribution of the dust concentrations was plotted on a histogram for each region. The standard deviation was 98, 108, and 134 for the residential, commercial, and industrial regions respectively. The industrial region had the highest concentration of iron, lead, zinc, manganese, copper, chromium, and cadmium, More iron was contained in the dust than any other metal; it accounted for 8 wt%, 5 wt%, and 4 wt% in the industrial, commercial, and residential regions, respectively.

28385 APTIC NO. 50097

Kanagawa Prefecture Center for Public Nuisance Control (Japan) and Kanagawa Prefecture Pharmaceutical Assoc. (Japan)

EFFECTS OF REMOVAL OF SULFUR OXIDES, SUSPENDED DUST, AND HEAVY METALS BY AIR CLEANERS INSTALLED IN CLASSROOMS. *(Kyoshitsu ni setchishita kukiseijoki ni yoru iwosankabutsu, fuyufunjin, jukinsoku no jokyo koka). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:160-172, Feb. 1972.*

Air cleaners were installed in the classrooms of schools located in heavily polluted districts. Sulfur oxides, suspended dust, and heavy metals were measured for 3 days with and without the cleaners. Results are tabulated. The cleaners use glass fiber filters and polyurethane filters to collect dust and activated carbon filters to remove SO2. The cleaners were quite effective in removing pollutants; concentrations of pollutants were considerably lower indoors when the air cleaners were operated or no longer operating, than outdoors. Thus, indoor pollution can be reduced by shutting out outdoor air, even when no air conditioner is used.

28386 APTIC NO. 50101

Kanagawa Prefecture Center for Public Nuisance Control (Japan) and Kanagawa Prefecture Pharmaceutical Assoc. (Japan)

SURVEY ON WIDE-AREA ENVIRONMENTAL POLLUTION BY CARBON MONOXIDE CAUSED BY AUTOMOTIVE EXHAUST GAS. *(Jidosha hishutsugasu ni yoru issankatanso no koikikankyoosen chosa). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:33-45, Feb. 1972.*

The carbon monoxide standard is 20 ppm for 8 consecutive hours and 10 ppm for 24 hours. Forty locations were monitored in 1970 and 1971 in Kanagawa Prefecture to determine if the standards were met for CO emitted by automobile exhaust gas. The number of automobiles that passed the locations during the survey were counted and CO concentrations were recorded. The 8-hour average was not exceeded. At major intersections, the CO concentration was 5-10 ppm. At one intersection, the 24-hour average was exceeded. There was a correlation between the quantity of automobile traffic and the CO concentration. The CO concentration increased from 1500 to 1730 hours.

28387 APTIC NO. 50114

REPORT BY THE URBAN HYGIENE DEPARTMENT OF THE BUDAPEST DISTRICT EPIDEMIOLOGICAL STATION (KOJAL) ON THE EVOLUTION OF THE AIR POLLUTION IN BUDAPEST DURING THE FIRST SIX MONTHS OF 1972. *(A fovarosi KOJAL telepulesegeszsegugyi osztalyanak tajekoztatoja Budapest levegoszennyezettsegenek alakulasarol 1972. I. feleveben). Text in Hungarian. Budapesti Kozegeszsegugy, no. 4:124-126, 1972.*

Results of total sulfur, settling dust, sulfur dioxide, nitrogen dioxide and chlorine monitorings conducted at 34 air pollution monitoring stations in Budapest during the first six months of 1972 are presented and compared to corresponding data obtained for 1970 and 1971. The total sulfur level in the air, measured by monthly 100-hour exposures, declined steeply compared to the two previous years, which was mostly due to structural changes in the energy supply system. The settling dust measurements however, failed to exhibit any falling trend. Twenty-minute values obtained for SO2 showed seasonal variations but no general decrease from the previous years; monthly averages were highest in densely populated sections, and fairly low in residential districts with remote heating systems and in industrial districts. The chlorine concentrations measured by 20-minute exposures showed considerable decrease. The NO2 concentrations obtained from 20-minute exposures showed no significant changes, and continued to be above the maximum acceptable concentration.

28388 APTIC NO. 50125

Yamaguchi Prefecture (Japan), Research Inst. of Health and Iwakuni City Government (Japan), Public Nuisance Div.

AIR POLLUTION OF URBAN AREAS OF IWAKUNI CITY (REPORT NO. 8). *(Iwakuni shigaichi no taiki osen ni tsuite). Text in Japanese. Yamaguchi-ken Eisei Kenkyusho Nenpo (Ann. Rept. Yamaguchi Prefect. Res. Inst. Health), no. 14:53-56, Aug. 1972.*

Data is given for sulfur dioxide and dust measurements made in Iwakuni city during 1971. There was a decrease in both pollutants from previous years, but heavy oil consumption is expected to double by 1975, and thus increase pollution in the future. The 1971 decrease was due to the use of low-sulfur heavy fuel oil (1.78%). Another reason was the frequency of northeast or southeast winds. More dust was found closer to factories, less as distance from factories increased. The most polluted area averaged 8.05 tons/sq km/mo; the maximum was 14.07 tons in May. The total average decreased from 1970 s 7.41 tons to 6.21 tons. The decrease is attributed to decreased winds and decreased coal consumption, which fell from 41,200 tons in 1970 to 30,300 tons in 1971.

28389 APTIC NO. 50181

Japan Environmental Agency and Yamaguchi Prefectural Government

A REPORT ON THE BASIC INVESTIGATIONS ON THE ENVIRONMENTAL POLLUTION IN THE AREAS INCLUDED IN THE POLLUTION CONTROL PLANS. *(Kogai boshi keikaku sakutei chiiki ni okeru kankyo osento kikon chosa hokukusho). Text in Japanese. 227p., 1972.*

In 1971, approximately 2,605,000 tons of heavy oil, 42,000, tons of coal, 372,000 cu km of gas, and 44,500 tons of coke were consumed in Yamaguchi Prefecture with a population of about 1.5 million and 1145 factories. Measurements of sulfur dioxide concentrations in five cities showed that SO2 pollution decreased from 1969 to 1971. The highest average concentration was 0.58 sulfur trioxide mg/100 cu m/day in Shimomatsu city. The particulate concentration in Tokuyama city increased from 8.73 ton/cu km/mo in 1969 to 11.02 ton/cu km/mo. The highest carbon monoxide concentration in 1971 was in the center city area in Tokuyama city. The average concentration of 8 consecutive hours was 11.7 ppm which was below the environmental standard.

28390 APTIC NO. 50207

Takaishi Municipal Government (Japan) Dept. of Public Nuisance

A REPORT ON THE INVESTIGATION OF AIR POLLUTION IN TAKAISHI CITY. *(Takaishi-shi taiki osen chosa hokokusho). Text in Japanese. 108p., Aug. 1972.*

Measurements of sulfur oxide concentrations by the conductivity method were conducted at Takaishi City hall from 1966 to 1971 and at the Hagomono school and Koyo grade school from 1969 to 1971. The concentration decreased remarkably from 1969 to 1971, from 0.030 to 0.018 ppm at the city hall, 0.038 to 0.024 ppm at the Hagomono school, and 0.042 to 0.015 ppm at the Koyo grade school. Measurements of dust concentrations in 1971 at four locations using a deposit cage showed an average value of 7.95 tons/sq km/mo which was lower than the previous year.

28391 APTIC NO. 50307

Office of Air Programs, Research Triangle Park, N. C., Div. of Atmospheric Surveillance

AIR QUALITY DATA FOR 1968, FROM THE NATIONAL AIR SURVEILLANCE NETWORKS AND CONTRIBUTING STATE AND LOCAL NETWORKS. *Pub-APTD-0978, 240p., Aug. 1972. 1 ref.*

NTIS: PB 213830

Air quality data for 1968 collected throughout the United States by the National Air Surveillance Network are presented. Data includes measurements of benzene-soluble organic fractions, including benzo(a)pyrene; inorganic nonmetallic ions, including ammonium, nitrates, sulfates, and fluorides; suspended particulate matter; metallic components of air samples including antimony, beryllium, bismuth, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, tin, titanium, vanadium, and zinc; soiling index; and gaseous pollutants, including carbon monoxide, nitric oxide, nitrogen dioxide, sulfur dioxide, total hydrocarbons, and total oxidants. Data are tabulated for urban and nonurban sites. Laboratory methodology and instrumentation are reviewed.

28392 APTIC NO. 50364

Chyba, Andrzej

ATMOSPHERIC AIR POLLUTION WITH NITROGEN OXIDES. *(Zanieczyszczenie powietrza atmosferycznego tlenkami azotu). Text in Polish. Gaz. Woda Tech. Sanit. (Warsaw), 46(10):335-337, 1972. 18 refs.*

Nitrogen oxide pollution sources and measurement data are reviewed. Urbanization, industrializatio, and increased automotive traffic are viewed as the main causes of the increasing nitrogen oxide concentrations in the air. Nitrogen oxide concentrations increased from 0.29 to 0.68 mg/cu m from 1969 to 1971 in Katovice, Poland. Related [illegible] collected along certain arteries of downtown Warsaw are tabulated. Considerable amounts of nitrogen oxides are emitted by chemical industries involving nitric acid, sulfuric acid, azo dye, fertilizer or exposive material production. Combustion processes occurring at high temperatures between 1500 and 2000 C generate large amounts of nitric oxide. Effluents from heating plants reach nitrogen oxide concentrations ranging from 0.6 to 7.0 kg/ton of combustion gas. A discussion of the photochemical reactions involving nitric oxide and nitrogen dioxide in the generation of ozone or under corresponding climatic conditions is included.

28393 APTIC NO. 50113

Kollar, Katalin and Endrene Kajel

AIR POLLUTION MEASUREMENTS IN SOME OF THE BUSIEST INTERSECTIONS IN BUDAPEST. *(Legszennyezesi vizsgalatok Budapest fobb kozlekedesi csomopontjain). Text in Hungarian. Budapesti Kozegeszsegugy, no. 4:113-117, 1972.*

Results of carbon dioxide, carbon monoxide, nitrogen oxide, sulfur dioxide, formaldehyde, acrolein, and dust 3,4-benzopyrene measurements performed at places of high traffic density in Budapest in 1970, 1971, and 1972 are presented. The nitrogen oxide, SO2, CO, and formaldehyde concentrations measured in 1971 were in the respective ranges of 0.12-0.20 mg/cu m, 0.15-0.31 mg/cu m, 4.0-6.1 mg/cu m, and 0.01-0.04 mg/cu m. The 1970 and 1971 averages of the 3,4-benzopyrene concentrations were in the respective ranges of 7.8-13.6 ppm and 6.3-9.9 ppm/g of dust, respectively, compared to control values of 4.6-6.9 ppm and 4.9-17.2 ppm. With a range of 3.5-17.7 ppm/g of dust the 1972 3,4-benzopyrene average showed a significant decrease from the previous levels, due to the decrease in the number of vehicles with diesel engines. The measured CO2, formaldehyde, nitrogen oxide, and CO concentrations showed no strong linear relationship with the traffic density, however, a rising tendency with increasing traffic density was obvious.

28394 **APTIC NO. 50000**

Nakano, Michio

CHANGES AND THE PRESENT SITUATION OF AIR POLLUTION. *(Taiki osen no suii to genkyo). Text in Japanese. Kankyo Joho Kagaku (Environ. Information Science), 1(3):3-13, Dec. 1972. 8 refs.*

From 1967-1968 onward, continuous monitoring of air pollution could be carried out. Since then monitoring systems using telemeters have been introduced; the monitoring network was expanded to 431 monitoring stations all over Japan as of Dec. 1971. Sulfur oxide concentrations in major industrial cities have either leveled off or gradually decreased since 1967, despite the fact that consumption of fuel oil increased 10-20% annually. After Dec. 1969, a stricter sulfur dioxide standard was adopted. Seventy cities conform to environmental standards, and 40 do not. Aerosol concentrations in various cities tended to decrease gradually. The ratio of nitrogen oxides concentration up to about 10 years ago was much less than SOx, but in some places, it now exceeds that of SOx. The hydrocarbon concentration tends to increase, due to a sudden increase in automobiles. Nitrogen oxides and nitrogen dioxide by itself have detrimental effects on health and cause photochemical reactions in the presence of HC. Carbon monoxide concentrations are especially high on roads with much traffic volume. High oxidant concentrations occur in Tokyo from April to October. Severe symptoms suffered by students in Tokyo, and Osaka are attributed to oxidants and to some complex pollutants. Patients suffering as result of air pollution in six designated areas have been on the increase, especially those less than 9 years old and over 60 years old. In order to plan effective anti-pollution programs, it is necessary for offending enterprises, as well as politicians and administrators to reflect on the past attitude, ignoring the importance of environmental problems.

1971

28395 **APTIC NO. 56576**

Kawaraya, Toshio, Kosuke Haruki, Michio Oka, Kinuko Tomita, Takashi Nakadoi, and Yusuke Hirata

AN INVESTIGATION OF SCHOOL ENVIRONMENT AFFECTED BY AIR POLLUTION. *(Taiki osen-to ni yori higai o ukete iru gakko no kyoiku kankyo chosa). Text in Japanese. Osaka-Shiritsu Eisei Kenkyusho Hokoku (Rept. Osaka City Inst. Hyg.), no. 34:126-128, 1971.*

The state of air pollution, the efficiency of air cleaners, and the difference between out-of-doors and indoors were tested at two schools in a heavily polluted coastal industrial area of Osaka. Sulfur dioxide, dusts, carbon monoxide and dioxide, and nitrogen oxides were measured. At Yodo School, all measurements were higher in the classroom than out-of-doors. This was true even when the air cleaner was in operation. The measurements were particularly high when the heating system was used in the classroom. The SOx concentration ranged between 0.12 to 0.28 ppm; NOx, 0.14 ppm; CO2 between 400 and 3100 ppm; and CO between 0.8 and 6.3 ppm. The CO counts in the playground ranged between 0.6 and 6.8 ppm. At Dekishima Elementary School, air cleaners showed some effect. Dusts measurements were between 150 and 180 micrograms/cu m indoors and 200 microgram/cu m outside. The CO measurements were 5-7 ppm in the classroom, 4.5-7 ppm outside; CO2 measurements ranged between 700 and 1900 ppm indoors. The SO2 counts when the stove was on were between 0.05 and 0.11, when no stove was used, 0.01-0.02 ppm. The NOx measurements in the playground ranged between 0.10 and 0.71; indoors when the stove was used, between 0.09 and 0.25; without the stove, 0.06 ppm.

28396 **APTIC NO. 50158**

Tomita, Kinuko, Shigeo Yamaoka, Toshio Kawaraya, Kosuke Haruki, and Yusuke Hirata

HYDROCARBONS AND METALS IN SUSPENDED PARTICULATES CLASSIFIED BY PARTICLE SIZES. *(Fuyu funjin no ryukei betsu takan hokozoku kagobutsu oyobi kinzoku seibun ganyuryo ni tsuite). Text in Japanese. Osaka-Shiritsu Eisei Kenkyusho Hokoku (Rept. Osaka City Inst. Hyg.), no. 34:124-125, 1971.*

The measurements of dusts, particle sizes, metals, and polynuclear aromatic hydrocarbons by particle size were taken in Kyoto and Osaka during the winter months. Two types of high-vol air samplers, a cascade centripeter, and a digital dust indicator were used for samplings. Metals were analyzed by an atomic absorption analyzer and polynuclear HC were analyzed by an automatic recording spectrophotometer or gas chromatography. The measurements of suspended particulates by four samplers were considerably different, ranging from 0.6 to 1.2 ppm. The particle size distribution revealed that the particles gathered in the stage A of the high-vol air samplers corresponded with the sizes gathered in stages I and II of the cascade centripeter. Approximately 40% of suspended particulates were these large particles. There was no difference in the particle size distribution of Kyoto and Osaka, but the quantity in Kyoto was half of that of Osaka. In both cities, the concentration of lead and cadmium were greater in smaller particulates, and iron was found more in large particulates. In both cities, polynuclear HC were found 3-20 times more in large particulates than in small ones. The polynuclear HC content in stack soot samplings was unexpectedly low and was lower than the concentration in suspended particulates.

ATMOSPHERIC INTERACTION

1973

28397 **APTIC NO. 50094**

Goto, Hiroki and R. L. Motard

SIMULATION FOR PHOTOCHEMICAL SMOG (2) -- LOS ANGELES BASIN. *(Kokagaku sumoggu no shimyureshion (2) -- Ros Angeles chiku). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 261-263, 1973. 2 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973, Paper B313.)*

The photochemical smog system and diffusion in the Los Angeles basin were studied by simulation on a hybrid computer system. Exhaust gases from cars cause 98% of the carbon dioxide, 85% of the hydrocarbons, and 70% of the nitrogen oxides in the area. Photochemical reactions were studied in a laboratory using propylenic hydrocarbons. Simulated results generally agreed with experimental results. Actual automotive exhaust gases have a low oxidizing property compared to that of laboratory exhausts because they probably contain hydrocarbons of a molecular weight higher than propylene.

28398 **APTIC NO. 50095**

Goto, Hiroki and R. L. Motard

SIMULATION FOR PHOTOCHEMICAL SMOG (1) -- DEVELOPMENT OF HYBRID COMPUTER SYSTEM. *(Kokagaku sumoggu no shimureshion (1) -- Haiburiddo keisanki shisutemu no tenkai). Text in Japanese. Preprint, Japan Society of Chemical Engineering, Tokyo, p. 258-260, 1973. 3 refs. (Presented at the Japan Society of Chemical Engineering, Annual Meeting, 38th, Tokyo, Japan, April 3-6, 1973.)*

A system was developed to rapidly calculate the smog concentration by a computer simulation on the basis of reaction of propylenic hydrocarbons. However, many reactions produce hydrocarbons other than propylene and the effect of the third substance is difficult to reproduce in a laboratory, so the reaction kinetics must be corrected. Euler s model can be used to represent the smog phenomena. The hybrid computer system can be used for the simulation of any area where the boundry condition and the initial condition of the HC and nitrogen oxide concentrations which occur on the ground are known. The hybrid computer can thus do direct simulation of the feature of the model, even in the complex smog system where many concurring reactions occur.

28399 APTIC NO. 50143

Grassmann, P.

PROBLEMS OF WASTE HEAT DISPOSAL? (Wohin mit der Abwaerme)? Text in German. Chem.-Ing.-Tech., 45(5):229-236, 1973. 37 refs. (Presented at the Jahrestreffen der Verfahrens-Ingenieure Cologne, West Germany, Oct. 3-5, 1972.)

The living world is being overtaxed by the rate at which man is changing the environment. This cannot be overlooked in connection with the rise in temperature of rivers used for carring away waste heat. The Rhine in particular is no longer able to cope with all the waste heat discharged into it without suffering ecological damage. In the future we shall therefore have to resort largely to the atmosphere as a heat sink by using dry and wet air coolers and cooling towers. Hence the amortization and running costs of equipment for disposal of waste heat will also rise. These extra costs will only be compensated by savings in cooling water consumption if the price of cooling water is correspondingly high. The economic use of waste heat is restricted by its inferior quality as a form of energy. Although the amount of heat produced by man is small, on a global scale, compared with that supplied by solar radiation it is already leading to climatic changes in certain regions.

28400 APTIC NO. 50146

Jernelov, Arne and Thomas Wallin

AIR-BORNE MERCURY FALL-OUT ON SNOW AROUND FIVE SWEDISH CHLOR-ALKALI PLANTS. *Atmos. Environ., 7(2):209-214, Feb. 1973. 7 refs.*

The local contamination of mercury emitted to the atmosphere from five Swedish chlor-alkali plants was investigated in the winter of 1971. The fallout patterns were surveyed by measuring mercury contents in the snow around the plants within a circular area (radius 4-6 km). Mercury was determined by neutron activation analysis. The highest concentrations of mercury were found close to the plants, and a rapid decrease was recorded with increased distance from the plants. Estimations of annual fallout were made within the circular area of a radius of 5.0 km, excluding the inner circle of radius of 0.5 km, and the results indicated that only a small fraction of the total amount of emitted mercury was deposited locally. The major part seems to spread over very large areas and probably contributes to the background levels in the region and/or to the global circulation. (Author abstract)

28401 APTIC NO. 50145

Naudascher, Eduard and Helmut Kobus

STUDY OF TRANSPORT PROBLEMS OF ENVIRONMENTAL POLLUTION. *(Erforschung von Stroemungsproblemen der Umweltverschmutzung). Text in German. Umschau (Frankfurt), 73(6):165-171, 1973. 10 refs.*

The research program at Karlsruhe University is discussed. It is aimed at providing a basis for predicting the spreading of wastes or cooling water in rivers or stack emissions in the atmosphere and developing new environmental protection techniques. One research project is studying a promising new method of off-gas dispersion in which waste gas is released in rings similar to smoke rings which some smokers blow. The smoke rises to much higher altitudes through this without requiring much energy. Inversion layers might be possibly penetrated by the rings. The ugly high stacks would disappear from the scene, and the emission would be adjustable. Prerequisite for the suitability of this method is the insensitivity to stronger wind. This is presently being studied and all results to date indicate that the method is applicable both for off-gas and waste water discharge.

28402 APTIC NO. 50119

Schmidt-Burbach, G. M.

URBAN MICROCLIMATE. *(Staedtisches Mikroklima). Text in German. Umschau (Frankfurt), 73(6):187, 1973. 1 ref.*

Urban climates differ from rural climates. The wind velocity is different due to the influence of buildings which weaken the horizontal wind field and increase the vertical component. To this must be added a certain thermal buoyancy of the air due to heavy heat load discharged in cities by industrial processes and heating. However, the air does not disperse upward due to this thermal buoyancy but returns to the bottom in the suburbs and flows back toward the center. The relative humidity is 2-8% lower in cities. The aerosol concentration is much higher, providing a large number of condensation nuclei for water vapor. This causes a more frequent occurrence of fog and clouds absorbing particularly ultraviolet radiation.

28403 APTIC NO. 50056

Smirnov, V. I.

ON THE APPROXIMATION OF EMPIRICAL SIZE DISTRIBUTIONS FOR CLOUD DROPS AND OTHER AEROSOL PARTICLES. *(Ob approksimatsii empiricheskikh raspredeleniy po razmeram oblachnykh kapel i drugikh aerozolnykh chastits). Text in Russian. Izv. Akad. Nauk SSSR, Fiz. Atmosfery i Okeana, 9(1):54-65, 1973. 23 refs.*

A formula is proposed for an approximate description of empirical size distributions of cloud drops and atmospheric aerosol particles. The approach is based upon the theoretical and experimental evidence of the establishment of stepwise size distribution of large cloud drops formed due to vapor condensation with growth in particle size. The formula is simple enough and agrees with often observed power distribution of large drops. It is compared with gamma distribution, in particular with the Khrgian-Mazin formula, and also with observational data for cloud drops and aerosol particles. The formula can be applied to any unimodal distribution transforming into power distribution for large particles. Methods of determining constants of the formula are described for distributions in differential and in integral forms.

28404 APTIC NO. 50022

Wippermann, F.

A COMPARISON OF TEMPORALLY CHANGING CONCENTRATIONS OF AIR POLLUTANTS WITH THOSE OF CORRESPONDING STATIONARY CASES. *(Ein Vergelich zeitlich veraenderlicher Konzentrationen von Luftbeimengungen mit denjenigen der entsprechenden stationaeren Faelle). Text in German. Meteorol. Rdsch., 26(1):11-18, 1973. 5 refs.*

Dispersion categories which vary mainly with the thermal stratification are discussed. For each category, diffusion parameters have been obtained empirically. Each category is considered separately from the next, even though the diffusion parameters of any category depends on the history of the category, namely if the preceding category had a less stable or more stable stratification. On a day with normal radiation conditions, the coefficient of turbulent diffusion for a certain category can differ by a factor of two, depending on the category preceding in time. The diurnal variation of the relevant meteorological parameters has been obtained by a numerical integration of time-dependent boundry layer model; the imput for this model was the diurnal variation of the thermal stratification. The results (averaged on the vertical) are applied to the formulas for the maximum concentration at the ground of a material dispersing from a continuous point source and for the distance of this maximum.

1972

28405 **APTIC NO. 50099**

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

ON REGIONAL CHARACTERISTICS, COUNTERMEASURES, AND RESEARCH SYSTEM OF PHOTOCHEMICAL SMOG. *(Kokagakusmoggu no chiikitokusei to taisaku oyobi kenkyu taisei ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:125-140, Feb. 1972.*

From May 31 to Oct. 15, 1971, 11 emergency smog alarms were issued in Kanagawa Prefecture. Victims, time of alarms, meteorological conditions, topographic conditions, day of week, and other facts are discussed. The oxidant density was highest from 1200 to 1500 hours, gradually decreasing thereafter. Smog days had 1000-meter visibility at 900 hour, wind velocities of 3 m/sec or lower, fine or cloudy weather, 25 C or higher atmospheric temperature, and wind velocities of 5 m/sec at 1500 m altitude and 10 m/sec at 3100 m. Alarms generally occurred downtown, some distance away from industrial areas, or in mountains or valleys in the case of suburban town. The monitoring system measures sulfur oxides and suspended dust. Research is being conducted on smog formation mechanisms, effects on humans, and effects on plants.

28406 **APTIC NO. 50349**

Ministry of International Trade and Industry (Japan), Bureau of Research Coordination

A REPORT ON THE SPECIAL INVESTIGATION OF WASTE GAS DISPERSION AND POLLUTION OVER THE SEA AND THE PREVENTION OF THE POLLUTION AND DISPERSION OVER THE LAND. *(Kiso haikibutsu no kaijo ido taiyo no haaku to rikujo eikyo boshi ni kansuru tokubetsu kenkyu hokokusho). Text in Japanese. 61p., 1972.*

Experiments were carried out at Shimoda-shirahama coast area for measurements of wind velocity and wind direction at height up to 1000 m above the ground atmospheric temperature at low wind velocity, and the ratio of land and sea winds. The structure of the atmospheric boundary layer was also measured, and an air tracer experiment was conducted using fluorescent particles. Primarily there were two wind systems, northeast and west winds, at 100-1000 m above the ground, and mostly the wind was higher than 5 m/sec. The ratio of sea wind and land wind was about 6:4. The highest diffusion coefficient was found at the vicinity of 300 m. The diffusion width above the sea was averagely smaller than that above the land.

28407 **APTIC NO. 50208**

Balafoutas, Georges J.

THE CONTRIBUTION OF HYDRAULIC MODELS TO AIR POLLUTION STUDIES. *(Sumbole ton Udraulikon omoiomaton eis ten meleten tes atmosphairiken rupanse os). Text in Greek. Tech. Chron. (Athens), no. 10:911-927, Oct. 1972. 21 refs.*

Theoretical basis and design of reduced, especially hydraulic, models for pollutant transfer and diffusion studies for specific sites are described. Pollutant diffusion and transfer phenomena can be studied by such models as a function of emission conditions and in situ measurement data by application of the Froude generalized similitude. Some results obtained by the Societe Grenobloise d Etudes et d Applications Hydrauliques with invese analogy type hydraulic models are presented. These models can be used to study plume behavior including looping, coning, trapping, fanning, lofting, and fumigation.

28408 **APTIC NO. 50147**

Calder, Kenneth L.

ABSORPTION OF AMMONIA FROM ATMOSPHERIC PLUMES BY NATURAL WATER SURFACES. *Water, Air, Soil Pollut., 1(4):375-380, Sept. 1972. 5 refs.*

A simple model is presented that incorporates the major features of atmospheric transport and diffusion of an ammonia plume together with aqueous absorption as the plume traverses a water surface. The model is based on the concept of deposition velocity. A specific application was considered to the gas release from an ammonia stripper of a hypothetical sewage treatment plant; ammonia aboarption by adjacent water masses could be considerable. (Author abstract)

28409 **APTIC NO. 50083**

Dreyhaupt, Franz Joseph

METHODS FOR DETERMINING PROTECTIVE DISTANCES BETWEEN INDUSTRIAL AND RESIDENTIAL AREAS FOR INCLUSION OF THE FACTOR EMISSION PROTECTION IN PLANNING. *(Methoden zur Ermittlung von Schutzabstaenden zwischen Industrie-und Wohngebieten zur Beruecksichtigung des Faktors Immissionsschutz in der Planung). Text in German. Luftverunreinigung, 1972:6-13, Dec. 1972. 8 refs. (Presented at the Landesbeirat fuer Immissionsschutz des Landes Nordrhein-Westfalen, Essen, West Germany, Nov. 13, 1972.)*

After reviewing methods for determining protective distances between industrial and residential areas, a new method is discussed. It is based on the use of mathematical meteorological diffusion models for predetermined emission situations (emission inventories). With these models the emissions in the vicinity of source are calculated. For the calculation, the type concentration, and frequency of industrial emissions in the neighboring areas are determined, and it is decided which emissions can be tolerated in what concentration and frequency in residential areas. This method does not only take into account the nuisance factor, but also the dangerousness. An emission inventory and statistical data concerning wind dispersion are required. Other methods are based on effect determinations. The diffusion calculation is only used for adjustment to certain topographical and climatological facts. A uniform measure of evaluation is derived from the duration of an annoyance and the number of people affected by it.

28410 **APTIC NO. 50353**

Fett, W.

METEOROLOGICAL INFLUENCES ON AIR POLLUTION. *(Meteorologische Einfluesse auf die Luftverunreinigung). Text in German. Schriftenreihe Ver. Wasser-, Boden- Lufthyg. (Berlin), no.38:255- 263, 1972. (Presented at the Conference on Environmental Protection and Public Health Service, Berlin-Dahlem, West Germany, March 13-18, 1972.)*

The atmosphere accumulates air pollutants and disperses them, it converts them and removes them. All this is achieved through the physical properties of the atmosphere, wind, turbulence, rain, and radiation. The wind is the most influential parameter. The wind direction determines the location to which pollutants are transported, the wind strength influences more the pollutant concentration. The turbulence determines the vertical and horizontal distribution of air pollutants. Precipitation is responsible for the washout of pollutants. But a reduction of the atmospheric pollutant concentration during rain is frequently due to side effects such as a change of air mass rather than washout. For chemical conversion of air pollutants, solar radiation in connection with the humidity plays an important role. Knowledge of the meteorological influences on air pollution is necessary for faster and efficient control of air pollution.

28411 **APTIC NO. 50332**

Huebschmann, W. and K. Nester

ASSESSMENT OF ATMOSPHERIC DIFFUSION FOR REACTOR INCIDENTS IN A DETERMINISTIC AND PROBABILISTIC VIEW. *(Eine Neubewertung der atmosphaerischen Diffusion bei Reaktors toerfaellen in deterministischer und probabilistischer Sicht). Text in German. Atomkernenergie, 20(4):315-319, 1972. 4 refs. (Presented at the Reaktortagung Hamburg, West Germany, April 14, 1972.)*

The atmospheric diffusion of gaseous radioactive pollutants in the case of a short term emission of up to 24 hours duration was assessed. The radioactive pollutant is assumed to be emitted from a 100 m high stack. Ground-level concentrations for every hour are calculated from meteorological measurements. The dose at a certain location is evaluated by summation of the hourly contributions over the emission time. The maximum dose, interesting from a deterministic point of view, occurs at 0.5 km distance with a probability of less than 1 promille. The dose of interest from a probabilistic point of view, is based on the product of dose multiplied by probability. This evaluation leads to doses about one order of magnitude lower than those obtained from conventional calculations. The static calculation method of the dose is generally valid for emission durations of up to 1 hr only. The maximum weighed doses, to be used at least for probabilistic safety analyses, remains, unlike the absolute maximum dose, constant, regardless of the emission duration.

28412 **APTIC NO. 50361**

Lubienska, Urszula

ATMOSPHERIC POLLUTION PROBLEMS. *(Problemy zanieczyszczania powietrza atmosferycznego). Text in Polish. Przegl. Papier., 28(12):419-421, 1972. 9 refs. 0*

A general review discussing sources, effects, and propagation of air pollution is presented. The increasing population needs, expanding industrialization, and intensified traffic lead to the pollution of the environmental air. The chronic action of the polluted air generates increased morbidity of respiratory tract and circulatory system diseases referred to as civilization - caused diseases. The number of sick days due to circulatory and respiratory ailments increased from 77.0 and 93.2 in 1955 to 115.6 and 180.7, respectively, in 1970 in Poland. Forests were converted used as pollution filter areas, and thousands of fruit-bearing trees were destroyed upon exposure to polluted air. Climatic and orographic conditions affecting the propagation of pollutants are illustrated. Plume behavior and diffusion are described.

28413 **APTIC NO. 50309**

Vadot, L.

THE TRANSPORT AND DIFFUSION OF POLLUTANTS AS AFFECTED BY OROGRAPHY. APPLICATION TO LOW-FLYING GROUND REGIONS. *(Influence de l orographie sur le transport et la diffusion des pollutants. Application a des zones de bas relief). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 25(348):454-455, Nov. 1972.*

Low-layer inversion studies performed in France and West Germany are reviewed, and general problems of the influence of mountains on atmospheric pollutant transport and diffusion are discussed. Inversion frequencies determined for a southwestern region as a function of altitude and temperature gradient show that temperature gradients of 8-10 C/100 m altitude, especially at an altitude of 50-100 m, are not infrequent between 5 and 7 am. Observations in West Germany revealed drops by a factor of 10 in the exchange coefficient during transitions from isothermal conditions to a temperature gradient of +1 C/100 m. The magnitude of the relief effect is dependent on the relative rather than on the absolute value of the altitude. Closed, though relatively shallow valleys are more favorable for the accumulation of cold masses, including pollutants, than deep ones. Periods of high stability usually coincide with periods of very low wind speed or calm. Inversions are primarily destroyed by insolation due to thermal turbulence, which may lead to very high pollutant concentrations in such periods. While it is difficult to forecast periods of high pollution from atmospheric density and orographic parameters by mathematical methods, hydraulic models, simulating cold masses by salt solutions, are valuable.

28414 **APTIC NO. 50133**

Varhelyi, Gabriella

ATMOSPHERIC POLLUTANTS FROM NATURAL AND MAN-MADE SOURCES. *(Termeszetes es mesterseges eredetu szennyezoanyagok a legkorben). Text in Hungarian. Idojaras (Budapest), 76(5/6):341-350, Sept.-Dec. 1972. 9 refs.*

Sulfur and nitrogen compounds of natural and anthropogenic origin in the atmosphere, and their interactions are reviewed. The emissions of natural pollutants such as carbon dioxide, carbon monoxide, hydrocarbons, hydrogen sulfide, nitrogen oxides, ammonia, and particulate matter amount to 140, 0.1, 0.1, 0.1, 0.5, 1.1, 1.2 and 0.2-0.4 billion tons yearly, respectively, compared to the values obtained for man-made emissions of these substances of 14, 0.28, 0.1, 0.003, 0.05 and 0.8-2.2 billion tons, respectively, with data on nitrogen compounds not being available. The anthropogenic SO2 emission is 140,000,000 tons yearly, originating mostly in combustion processes. Sulfur dioxide reaching high atmospheric levels oxidizes to sulfur trioxide to form sulfuric acid, while its photochemical oxidation in the presence of nitrogen oxides, olefins, and certain catalysts such as fog droplets and heavy metal ions, is of primary concern. Emitted SO2 is present in the atmosphere over about 4 days. Hydrogen sulfide, present in the atmosphere over 2 days, forms SO3 and finally sulfuric acid in the presence of ozone and water. Sulfur dioxide with ammonia can also form ammonium sulfate aerosol in the presence of humidity. Nitrous oxide, nitrogen dioxide, and nitric oxide may form nitrites and nitrates in the presence of humidity, solar radiation, and certain catalysts. Nitric oxide can combine with ozone to form NO2. The photodissociation of NO2 into NO and nascent oxygen, and the formation of and reaction with olefins of ozone constitute the basic mechanism of the formation of photochemical smog.

28415 **APTIC NO. 50321**

Werner, C.

LIDAR MEASUREMENTS OF ATMOSPHERIC AEROSOL AS A FUNCTION OF RELATIVE HUMIDITY. *Opto-electron., 4(2):125-132, May 1972. 8 refs.*

The correlation between the size of atmospheric aerosols and relative humidity was studied by means of lidar measurements. The increase in backscatter coefficient characteristically observed just below an inversion was a consequence of the increased size of particles at greater humidities. Lidar, therefore, can be used to determine an equivalent scattering coefficient representative of a particular air mass for further prediction of slant-range visibility; changes in humidity; and aerosol washout in the vicinity of clouds. (Author conclusions modified)

1971

28416 **APTIC NO. 50297**

McElroy, James Lee

AN EXPERIMENTAL AND NUMERICAL INVESTIGATION OF THE NOCTURNAL HEAT- ISLAND OVER COLUMBUS, OHIO. *Pennsylvania State Univ., University Park, Dept. of Meteorology, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Dec. 1971, 144p. 86 refs.*

An experimental and numerical investigation was conducted of the nocturnal heat island over Columbus, Ohio. The experimental data were collected over metropolitan Columbus during each of four periods in September 1968 and March 1969. Vertical profiles of temperature and moisture were obtained, and measurements of surface temperature were made. The field experiments indicate that for stable meteorological conditions in the upwind rural environs, a thermal boundary layer usually began to develop in the upwind residential area. The boundary layer continued to grow into the central business district. The lapse rates of temperature within the layer ranged from slightly stable to superadiabatic. Downwind of the downtown area, the air restabilized, commencing at the surface. Beyond the urban area, the thermal stratification essentially returned to its upwind rural character. On many occasions, particularly under moderate wind speed and early in the evenings, advection of warmer urban air was noticed aloft. The depth of the thermal boundary layer in the downtown area varied between 30 and 100 m. Air samples furnished evidence that the elevated inversion over the city at night acted as an effective lid to the vertical dispersal of passive pollutants emitted within the thermal boundary layer. Artificial heat generally represented less than 20% of the excess city heat during the September periods and between 15 and 40% during the March periods. A two-dimensional numerical model to stimulate the thermal structure of the nocturnal heat-island was developed from a non-advective boundary layer model due to Estoque. The model was primarily modified by replacing the local time derivatives by the total time or Lagrangian derivatives. The model can be utilized to furnish useful information for urban diffusion models, for air pollution abatement strategies, and for operational air pollution warning systems.

28417 **APTIC NO. 50241**

Nicolet, M. and E. Vergison

NITRIC OXIDE IN THE STRATOSPHERE. *(L oxyde azoteux dans la stratosphere). Text in French. Aeron. Acta A, no. 90, 1971, 19p., 10 refs.*

NTIS: N72 14382

The formation and dynamism of nitric oxide in the stratosphere were studied. The formation of NO in the lower stratosphere is due to the reaction of nitrous oxide with excited oxygen atom. The total production of NO molecules is related to the eddy diffusion coefficients in the stratosphere which is required to sustain N2O subject to photodissociation. With eddy diffusion coefficients between 1000 and 10,000 sq cm/sec, the natural production of NO molecules is of the same order of magnitude as the artificial injection in the lower stratosphere by 500 supersonic jets. The N2O present in the lower stratosphere originates in the troposphere, and is not anthropogenic in nature.

BASIC SCIENCE AND TECHNOLOGY

1973

28418 **APTIC NO. 50144**

Boivin, Marcel

A SIMPLIFIED APPROACH TO VAPOR EMISSIONS FROM HYDROCARBON MIXTURES. *(Vue simplifiee de l emission de vapeur par un melange d hydrocarbures). Text in French. Gaz Aujourd Hui, 97(1):3-15, Jan. 1973.*

Theoretical considerations on the molecular mechanism of vapor emission by hydrocarbon mixtures are presented. Temperature dependent variations of bond energies acting between individual molecules and between the liquid and gaseous phases were studied. The intermolecular bond is strongly influenced by the degree of symmetry of the molecular structure. Thus, elongated and flat molecules do. The vapor emission of mixtures is strongly influenced by the molecular arrangement occurring in the liquid phase. The vapor tension of ethane-propane, ethane-butane, and propane-butane mixtures is only slightly dependent on temperature, unlike that of mixtures of methane with ethane, propane, or butane.

28419 **APTIC NO. 50055**

Gass, J. L., F. Juillet, and S. J. Teichner

PREPARING METAL OXIDE AEROSOLS BY THERMAL DECOMPOSITION OF THEIR ALCOHOLATES IN VAPOR PHASE AND PROPERTIES OF THE SOLID PHASE. II. PREPARATION OF TITANIUM, ALUMINUM AND SILICON OXIDES. *(Preparation des aerosols d oxydes metalliques par decomposition thermique des alcoolates en phase vapeur et proprietes de ces solides. II. - Preparation des aerosols d oxyde de titane, d alumine et de silice). Text in French. Bull Soc. Chim. France, no. 2(Part 1):429-435, Feb. 1973. 17 refs.*

Titanium oxide, aluminum oxide, and silicon dioxide aerosols were prepared from atomized titanium propylate, titanium tetrachloride, and aluminum butylate, silicon methylate and silicon butylate, respectively. The oxidation temperatures usually ranged from 660 to 870 C, the precipitator electrode voltage was 18 kV. The aerosol particle size increased with increased material expenditure, and the particle size was also influenced by such factors as preparation conditions (in anhydrous atmosphere or in water vapor) and reaction temperature. Water vapor accelerated considerably the crystallization process, expecially at elevated reaction temperatures. With material expenditure given, the aerosol particle diameter passes through a minimum pertaining to a temperature limit beyond which change in the crystalline structure occurs.

28420 **APTIC NO. 50021**

Hesse, Diethard

INFLUENCE OF FINITE PORE LENGTH ON THE DIFFUSION OF GASES THROUGH POROUS MATERIALS. *(Ueber den Einfluss der endlichen Porenlaenger auf die Diffusion von Gasen durch poroese Stoffe). Text in German. Chem.-Ing. Tech., 45(7):442-449, 1973. 34 refs.*

According to the pore models given in the literature, the resistance to diffusion through porous materials depends only on the ratio of the average pore diameter to the mean free path and on a structural parameter that is independent of the nature and pressure of the gas. No account was previously taken of the finite pore length. However, the ratio of the average pore radius to the averge pore length has a significant effect on the resistance to transport when it approaches the order of one as a consequence of falling path length. This effect is large mainly for small Knudsen numbers and leads to the observation of higher resistance to transport than that predicted by the models. A transport expression is proposed that accounts for the effect of end corrections on the transport process. Diffusion of ortho/para hydrogen through a glass frit confirms the expression reported.

28421 **APTIC NO. 50074**

Lipkea, William H., David Milks, and Richard A. Matula

NITROUS OXIDE DECOMPOSITION AND ITS REACTION WITH ATOMIC OXYGEN. *Combust. Sci. Technol., 6(5):257-267, Jan. 1973. 16 refs.*

The thermal decomposition of nitrous oxide was studied in a single-pulse shock tube in a temperature range 1300 to 1950 K at a total concentration of 0.00002 moles/cu cm. The Arrhenius rate constant for the primary reaction N2O + M yields N2 + O + M is given by k1 equals 10 to the 13.1 power exp (-44,100/RT) cu cm/mole sec. The ratio of the rate constants for the two competing secondary reactions, N2O + O yields N2 + O2 and N2O + O yields NO + NO, was also determined and was k3/k2 yields 0.50. Linear relationship between k1 and temperature in K degrees was determined. (Author abstract modified)

28422 **APTIC NO. 50059**

Maurice, Jacques

SPECTROPHOTOMETRIC DETERMINATION OF TRACES OF MERCAPTANS IN LIGHT HYDROCARBONS. *(Spektrophotometrische Bestimmung von Spuren von Mercaptanen in Leichten Kohlenwasserstoffen). Text in German. Erdoel Kohle (Hamburg), 26(3):140-143, 1973. 9 refs. (Presented at the Deutsche Gesellschaft fuer Mineraloelwissenschaft und Kohlechemie, Gemeinschaftstagung, 3rd, and the Oesterreichische Gesellschaft fuer Erdoelwissenschaften, Nuernberg, West Germany, Oct. 4, 1972.)*

The reagent 5,5-dithio-bis-(2-nitrogenzoic acid) was used for the spectrophotometric determination at 412 nm of thiol groups in liquefied petroleum gas, mainly butane. The scission reaction of the S-S bonding is slow, and it was necessary to set up a special device to conveniently perform this reaction between mercaptans contained in the butane phase and the reagent dissolved in an aqueous phase. The results were compared with those given by polarographic analysis. The spectrophotometric method allows the determination of mercaptans at a level of about 0.02 ppm.

28423 **APTIC NO. 50075**

Stone, Jack P., Robert N. Hazlett, J. Enoch Johnson, and Homer W. Carhart

THE TRANSPORT OF HYDROGEN CHLORIDE BY SOOT FROM BURNING POLYVINYL CHLORIDE. *J. Fire Flammability, vol. 4:42-51, Jan. 1973. 29 refs.*

The adsorption of hydrogen chloride on soot aerosol formed during the burning of mixed polyvinyl chloride/polyethylene torches was studied. The size of the soot particles ranged from 0.03 to 0.11 micron. The amount of soot accounted for 10 to 12% of the torch sample. About 19 mg HCl/g soot aerosol could be removed easily by a nitrogen purge, while 27 mg HCl/g soot was tightly bound and was not removed by a nitrogen purge.

28424 **APTIC NO. 50185**

Suzuki, Shin, Nobutoshi Horiuchi, Noriyasu Imai, and Wataru Ando

INVESTIGATION OF GAS-PHASE PHOTOCHEMICAL REACTION OF SULFUR DIOXIDE WITH ORGANIC COMPOUNDS (REPORT 4). *(Aryusan gasu to yukikagobutsu tono kokagaku hanno ni kansuru kenkyu, 4). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 670, 1973. (Presented at Japan Chemical Society, Spring Meeting, 28th Tokyo, Japan, April 1-5, 1973, Paper 2D27.)*

A mixture of sulfur dioxide, cis- or trans-2-butene, oxygen, and nitrogen in U-shape tube was irradiated by a high pressure mercury lamp. The products were analyzed by a combination of gas chromatography and mass spectroscopy. Some sticky products having a higher mass number than sulfur dioxide and 2-butene were obtained. Thin layer chromatographic separation suggested that the products from cis-butene were different from those of trans-butene.

1972

28425 **APTIC NO. 50098**

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

QUANTITATIVE DETERMINATION OF LEAD IN GASOLINE BY ATOMIC ABSORPTION SPECTROPHOTOMETRIC ANALYSIS. *(Genshikyuko kodoho ni yoru gasorinchu no namari no teiryoho). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:147-151, Feb. 1972.*

An atomic absorption spectrophotometer using lead nitrate as the standard substance is very effective in determining tetraethyl lead in gasoline. The method and its calibration are described in detail. The method can complete an analysis in 10 min compared with the standard spectrophotometric method using tetraethyl lead as the standard substance which takes 2 days; it is also safer than the standard method.

28426 **APTIC NO. 50107**

Copp, D. A. and A. B. Ponter

THE EFFECT OF LIQUID VISCOSITY ON MIXING IN FALLING FILMS. *Waerme Stoffuebertragung, 5(4):229-238, 1972. 15 refs.*

The effect of liquid viscosity on mixing in falling liquid films was investigated using a Macropore to simulate conditions in a packed column. Mass transfer coefficients and transfer unit heights were calculated for the absorption of stagnant carbon dioxide at atmospheric pressure and 25 C into aqueous glycerol for a range of liquid rates and glycerol concentrations, and the values were compared with those from penetration theory correlations. Deviations from expected behavior were observed, notably that the exponent on the overall mass transfer coefficient with respect to film Reynolds number is significantly greater than the value of 1/3 predicted from the Higbie model. Mixing at the discontinuities is more than 75% complete for pure water, but this mixing factor decreases with increasing viscosity. (Author abstract modified)

28427 **APTIC NO. 50284**

John, Walter and John W. Davis

THE MEASUREMENT OF THE CHARGE DISTRIBUTION ON MONODISPERSE AEROSOLS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, 13p., 1972. 4 refs.*

A simple method for determining the electrostatic charge on a monodisperse aerosol was developed, based on measurements of the transmission of the aerosol through the electric field of a parallel plate analyzer. An improved data analysis technique was used to determine charge distribution. The method was applied to 0.357 micron polystyrene latex aerosols neutralized with a radioactive source. The results were in good agreement with the equilibrium Boltzmann distribution. The charge distribution was also determined for highly charged latex aerosol. (Author abstract modified)

28428 **APTIC NO. 50132**

Presser, K. H.

MASS TRANSFER SOLID-GAS BY LAMINAR FREE CONVECTION. *(Die Stoffuebertragung fest-gasfoermig bei laminarer freier Konvektion). Text in German. Waerme Stoffuebertragung, 5(4):220-228, 1972. 14 refs.*

Mass transfer by laminar free convection was measured at the vertical flat plate, the horizontal cylinder, the sphere, and in half open rooms. The sublimation of camphene, paradichlorobenzene, and camphor in atmospheric air reached a variation of the Grashof and Schmidt-number. The result confirmed well-known laws of the flat plate and the cylinder within the range of 10 less than the Grashof mass transfer number less than 10 to the 6th power and 2.2 less than the Schmidt number less than 2.6. Within the range of 200 less than the Rayleigh number for mass transfer less than 2 times 10 to the 6th a new relation is stated for the sphere. Eddies were produced by the convection flow inside the half open room. At this geometry the Sherwood number is approximately equal to the Rayleigh number for mass transfer to the 0.5 power.

28429 *APTIC NO. 58366*

Weychert, Stefan and Jan Petryk

THE KINETIC EQUATION FOR THE CONVERSION OF CARBON MONOXIDE WITH STEAM. (Rownania kinetyczne konwersji tlenku wegla para wodna). Text in Polish. Przemysl Chem., 51(6):385-390, June 1972. 31 refs.

The kinetics of carbon monoxide conversion by the water steam contact procedure described in 24 papers are compared. Catalysts such as iron or zinc oxides under different composition, particle size, and temperature conditions applied in the process are listed along with the authors. A wide range of differences in the evaluation of the effect of the reactant concentration on the reaction rate was found between the equations developed by different authors. Too little attention has been focused on the internal diffusion processes as affecting the reaction rate. The above equations are concluded to be mere empirical narrow application relationships which are not appropriate for kinetic level studies. No data appropriate for the development of a general equation of the rate of the CO conversion process which would provide the means of designing the optimum conditions of the process are available as yet.

1971

28430 APTIC NO. 58249

Berglund, Birgitta, Ulf Berglund, and Thomas Lindvall

ON THE PRINCIPLE OF ODOR INTERACTION. *Acta Psychologica, vol. 35:255-268, 1971. 22 refs.*

The principle of odor interaction for two organic sulfides mixed at various levels of perceived intensity was studied. The odor components of dimethyl sulfide and dimethyl disulfide and the mixtures were measured with regard to subjective intensity. A two-step scaling method involving cross-modality matching and numerical scaling of the matching continuum was used. The perceived intensities of the mixtures were directly proportional to the arithmetic sum of the perceived intensities of the components constituting the mixture. The results were also assessed in terms of the power law. (Author abstract modified)

28431 APTIC NO. 58240

Shapunov, L. A., N. I. Parnyuk, T. V. Gosteminskaya, and T. S. Kuratova

SPECTROCHROMATOGRAPHIC METHOD FOR THE DETERMINATION OF MICROCOMPONENTS IN GASES. *(Spektrokhromatograficheskiy metod opredeleniya mikroprimesey v gazakh). Text in Russian. Zavodsk. Lab. (Moscow), 37(9):1066-1069, Sept. 1971. 3 refs.*

A combined chromatographic and spectrometric method for the separation and determination of inorganic and organic sulfur compounds in natural and coke gas, as well as in the ethylene fraction of the latter, is described. Chromatographic separation is done on chromosorb W at room temperature, the helium flow at 1.3 cu cm/sec. The respective durations necessary for the separation of methane, ethylene, hydrogen sulfide, and methyl mercaptan are 90, 90, 135, and 465 sec. Heavier organic sulfur compounds are separated on the modified column. Spectrometric determination by means of high-frequency generator utilizes atomic instead of molecular lines, in ensuring linear relationship between line intensity and sulfur concentration. The sensitivity of the determination is not influenced by the type of the sulfur containing compounds. The sensitivity at 9212.9 Angstrom is 0.0000005% of carbon disulfude per volume.

1970

28432 APTIC NO. 58230

Andrzejewski, R.

FUNDAMENTALS OF COAGULATION THEORY. *Air Conserv. (English translation from Polish of: Ochrona Powietrza), 4(3):34-48, 1970. 22 refs.*

NTIS: TT 70-551243

Theoretical studies of particle coagulation are reviewed. Coagulation, resulting in aggregate particles of increases size and lower particle concentration, is influenced by processes indirectly initiating this phenomenon, such as mechanical disturbances, variations of particle concentration, temperature, electric discharges, and sound waves. Problems of collision effectiveness, collision and coagulation probabilities, and the effect of molecular movements on coagulation are discussed. Experiments indicate that the coefficient of collision effectiveness of 0.1-1 micron particles is equal to or close to unit. The coagulation constant for longitudinal, bar-, rod- or thread-shaped particles is much higher than for spherical particles. In the latter case collisions may take place along three degrees of freedom of translatory motion, whereas in the case of longitudinal particles there are two or more degrees of freedom of rotary motion. The interaction zone and hence the coagulation rate of longitudinal particles are consequently much larger. Coagulation constants obtained experimentally are generally higher than calculated values, which may be explained by the effect of molecular forces.

28433 APTIC NO. 58301

Galpern, G. D., T. S. Bobruyskaya, Ye. S. Brodskiy, T. A. Bardina, Ye. N. Karaulova, R. A. Khmelnitskiy, and A. A. Polyakova

CHEMICAL AND MASS SPECTROMETRIC INVESTIGATION OF SULFUR COMPOUNDS IN THE MEDIUM FRACTION OF SOUTH-UZBEK PETROLEUM. *(Khimicheskoye i mass-spektrometricheskoye issledovaniye sernistykh soyedineniy sredney fraktsii Yuzhno-Uzbekskoy nefti). Text in Russian. Neftekhimiya (Russia), 10(5):741-747, 1970. 7 refs.*

Selective two-stage oxidation of sulfides of the 200-400 C fraction of South-Uzbek petroleum, chromatographic separation of sulfoxides converted into corresponding sulfides, and mass spectrometric determination are described. The first stage heterogenous emulsion oxidation of the sulfides results in the conversion of about 70% of all sulfides into sulfoxides. Thiamonocyclanes and thiabicyclanes are prevalent among such sulfides. Mass spectrometric analyses revealed the high selectivity of the heterogenous oxidation with respect to sulfides, since the sulfides obtained were free from thiophene derivatives and hydrocarbons, while dialkyl sulfides formed sulfoxides quantitatively. The second-stage homogenous oxidation by means of hydrogen peroxide in acetic anhydride led to the conversion of some 20% of the sulfides into sulfoxides among which thiamonocyclanes and thiabicyclanes were again prevalent. A small proportion of thiophene and benzothiophene derivatives also oxidized, while the average molecular weight and the rate of hydrogen saturation of the sulfides obtained were somewhat higher than those of the sulfides from the heterogenous oxidation. The combination of the two-stage oxidation with chromatographic separation and mass spectrometric determination revealed the predominance, among the thiophene and aromatic hydrocarbon derivatives, of benzothiophene and benzene derivatives, respectively, basically in the form of molecules containing a polymethylene ring. The single-stage homogenous oxidation of the sulfides, conducted qualitatively in acetic acid, requires preliminary removal of methane and naphthene hydrocarbons which impede homogenization.

28434 APTIC NO. 50271

Remsberg, E.

MEASUREMENTS IN THE INFRARED OF OPTICAL CONSTANTS OF SOME PROBABLE STRATOPHERIC AEROSOL CONSTITUENTS. *In: Particulate Models: Their Validity and Application. National Center for Atmospheric Research, Boulder, Colo., Rept. N72-19357-380, p. 119-128, Aug. 21, 1970.*

NTIS: N72-19357-380

The complex infrared index of refraction of sulfuric acid aerosol in solution with water was studied using attenuated total reflection spectroscopy. The observable parameters were the angle of incidence, the reflectivity, and the polarization of the instrument. The values n and k were solved by an iterative computer technique. Peaks in k for 75% H_2SO_4 appeared at about 9.6 and 11.2 microns. For 90% H_2SO_4, a sharp peak in k was determined at about 10.3-10.4 microns. There was broad absorption over the entire region of the atmospheric window.

EFFECTS-HUMAN HEALTH

1973

28435 APTIC NO. 50367

Tokyo Metropolitan Government (Japan)

AIR POLLUTION CONTROL MEASURES. *(Taiki osen boshi taisaku). Text in Japanese. In: Tomin o kogai kara boei suru keikaku. (Plans for the Protection of Citizens from Public Nuisance). p. 33-154, 1973.*

An overall picture of air pollution control measures for the Tokyo Metropolitan area together with the past surveys, present conditions, the trends, and various standards are discussed. A major portion is the discussion of various pollutants in automotive exhausts such as carbon monoxide, hydrocarbons, nitrogen oxides, lead, and aldehydes. Another major section is a discussion of photochemical pollution. Photochemical smog incidents, monthly fluctuations of oxidant concentrations, emergency treatments, control measures for emission sources of both fixed and mobile nature, and investigation and research programs are discussed. A general survey shows that the total reported photochemical smog victims in 1972 were 8437 as against 28,223 in 1971 and 10,064 in 1970. Incidents occurred in the entire Metropolitan area (23 wards) and three cities of Tama area. Geographically, the central area of Tokyo (western and southern wards, Musashino, Mitaka, Chofu, and Komae) had 6451 victims (77% of the total). The individual wards with highest numbers of victims were Nerima with 1781 people (21%), and Setagaya with 1023 (12%). Of the total number of victims, 46% were schoolchildren, but the ratio was lower than the previous year. The characteristics of photochemical smogs, elements causing photochemical reactions, the results of researches, the meteorological factors, plant damage, clinical studies of smog on respiratory and other types of patients, and various medical effects of oxidants are discussed.

28436 APTIC NO. 50373

Ministry of Health and Welfare Tokyo (Japan), Bureau of Child and Family Care

EPIDEMIOLOGICAL INVESTIGATION AND STUDIES ON MOTHERS MILK POLLUTION BY PCB. *(PCB ni yoru bonyu osen ekigaku chosa kenkyu ni tsuite). Text in Japanese. Kankyo Hoken Repoto (Environ. Health Rept.), no. 18:55-60, March 1973.*

A comprehensive investigation of the polychlorinated biphenyl (PCB) pollution of mothers milk was conducted in 52 Prefectures excluding Tokyo and three other Prefectures. Samplings were taken from 671 mothers with 1-4 month old babies between July 15 and Aug. 20, 1972, from 113 districts including urban residential, agricultural, fishing, and polluted industrial areas. The PCB residue concentration in the milk and the health conditions of the mothers and infants were examined. From all but one samplings, PCB residue was detected, with a maximum of 0.2 ppm. The total average residue was 0.035 ppm; the average in the urban residential areas, 0.038 ppm, fishing villages 0.045 ppm, polluted industrial areas 0.040, and agricultural areas 0.028 ppm. The average in agricultural areas was notably lower. The ratio of a high concentration of PCB residue in the milk was greater among the mothers with first babies than those with other children. Detailed health examinations were given to 31% of the mothers and 21% of the infants. Sixteen percent of the mothers had more than 130 mm Hg maximum blood pressure, 5% positive protein in the urine, and 10% anemia. One percent of the babies had pigment depositions on skin or membranes, and 3% had gummy secretion in the eye. But the connection between PCB and these symptoms was not ascertained.

28437 APTIC NO. 50372

Ikeda, Yoshio

A SUMMARY REPORT OF STUDIES ON THE CHRONIC TOXICITY OF PCB. *(PCB no mansei dokusei ni kansuru kenkyu, sokatsu kenkyu hokoku). Text in Japanese. Kankyo Hoken Reporto (Environ. Health Rept.), no. 18:41-42, March 1973.*

Experiments were conducted on mice to see the acute toxicity of PCB (polychlorinated biphenyls), using various types and degrees of purity. Acute poisoning, intestinal absorption, biological half-life, and residue accumulations were examined. By hypodermic injections, lethal dose 50 varied between 3060 mg/kg (95% purity trichloride biphenyl) to 11,300 mg/kg (KC-300). When 500 micrograms were orally administered daily, the intestinal absorption rate was 30-40%. The biological half-life using 2,4 dichlorinated biphenyl was less than 12 hr; trichlorinated biphenyl, 3-4 days; tetrachlorinated, approximately 6 days, and pentachlorinated, 20-25 days. The daily administration (for 30 days) of 100 micrograms of tetrachlorinated biphenyl did not show any accumulation, but pentachlorinated biphenyl showed a clear accumulation. The anesthetizing time required for a female rat by an abdominal injection of hexobarbiturate 150 mg/kg is significantly shortened by the pretreatment by KC-400 5 mg/kg/ three times/day or KC-500 2 mg/kg/three times/day, and had no effect for less dosages. Also KC-400 0.3 mg/kg/6 times/day showed a significant effect on the nerve system. The PCB had no direct effect on the hormone functions of the womb, but under the presence of estradiole, the functions were enhanced. The neutral fat and free lipid acid decreased drastically under the influence of KC-400 and 6-12 mg/kg/day. The chronic effect of PCB showed some morphological anomalies and a slight growth impairment with a large dosage of PCB.

28438 APTIC NO. 50062

Kosmider, St., A. Misiewicz, E. Felus, M. Drozdz, and K. Ludyga

EXPERIMENTAL AND CLINICAL STUDIES ON THE EFFECTS OF NITROGEN OXIDES ON IMMUNITY. *(Experimentelle und klinische Untersuchungen ueber den Einfluss der Stickstoffoxyde auf die Immunitaet). Text in German. Int. Arch. Arbeitsmed., vol. 31:9-23, 1973. 30 refs.*

The immunity of guinea pigs was lowered after 6 mo exposure to 1 ppm nitrogen oxides; there was an increased incidence of injection, and the respiratory organs were particularly affected. Immunological examination revealed reduced hemolytic activity of the complement, while immunoelectrophoresis showed a reduction in all fractions. When mice were infected with pneumonia and exposed to NOx they had a higher mortality than the control group. The lowered immunity was due to impaired protein synthesis, which was confirmed by striking inhibition of weight gain in guinea pigs suffering from chronic intoxication. Patients who had suffered harmful occupational exposure to nitrogen oxides were clinically examined. They had a depressed protein level, reduced albumin and IgG globulin levels and raised IgA and IgM immunoglobulin levels. The latter may be indicative of frequent bacterial infections of the respiratory organs following NOx exposure. The reduced IgG globulin levels may be due to impaired synthesis caused by NOx and could be the reason for the lower immunity to infection in the patients affected.

28439 **APTIC NO. 50225**

Kosmider, St. and A. Misiewicz

THE INFLUENCE OF LONG-TERM EXPOSURE TO THE OXIDES OF NITROGEN ON THE AMINOTRANSFERASE ACTIVITY STUDIED IN CLINICAL AND ANIMAL EXPERIMENTS. *(Der Einfluss protahierter Einwirkung von Stickstoffoxiden auf die Aminotransferasen-Aktivitaet in klinischen und tierexperimentellen Untersuchungen). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(2):108-110, 1973. 21 refs.*

The influence of oxides of nitrogen on the respiratory system is known. From the lungs, the oxides of nitrogen enter the blood in form of nitrates and nitrites then they affect the activity of the lactate dehydrogenase and aldolase, impair the interferon synthesis, change the activity of the phagocytes, reduce resistence to bacterial and virus infections, and slow down the weight gain in some animals. The influence of NOx on the activity of the aminotransferase was studied with 80 guinea pigs. A control group of 50 animals was exposed to clean air, 30 male guinea pigs were exposed to 1 ppm NOx 8 hr/day for a period of 180 days. An air temperature of 22 to 23 C was maintained, and the relative humidity was 65 to 70%. About 6000 l/hr of air were supplied. All animals survived the 6-month experiment. The activity of the aspartate-aminotransferase (AspAT) and of the alanin-aminotransferase (ALAT) in the blood serum and the heart of the NOx-exposed animals was significantly higher than that of the control group. A statistically significant decrease of the activity of these enzymes was observed in the liver, a lesser, statistically insignificant decrease in the brain. A clinical examination of 70 occupationally exposed men aged 26 to 48 years revealed a lower AspAT and ALAT activity than a non-exposed group.

28440 **APTIC NO. 50161**

Kuehnert, M.

EMISSIONS AND THEIR IMPORTANCE FOR CATTLE BREEDING AND HUMAN HEALTH. *(Immissionen und ihre Bedeutung fuer die Tierproduktion und die menschliche Gesundheit). Text in German. Z. Ges. Hyg. Ihre Grenzgebiete (Berlin), 19(2):89-98, Feb. 1973. 28 refs. (Presented at the Gemeinschaftstagung der Gesellschaft Allgemeine und Kommunale Hygiene der DDR undder Wissenschaftlichen Gesellschaft fuer veterinarmedizin der DDR, May 8-15, 1972.)*

The effects of fluorine, carbon monoxide, metals such as lead, mercury, and arsenic, and hydrocarbons on cattle and man are reviewed, and data on maximum allowable emission concentrations for these substances in the U. S. are listed. In the German Democratic Republic the emission regulations of June 28, 1968 include maximum allowable emission concentrations for various pollutants, e.g., lead 0.0007 mg/cu m (24 hour value); fluorine 0.01 mg/cu m, sulfur dioxide 0.15 mg/cu m, and oxides of nitrogen 0.1 mg/cu m. Fluorine injuries of a chronic nature were witnessed in East Germany. In young cattle the following F concentrations were measured, lower jaw bone (ash) 2700 ppm, ribs up to 3500 ppm. Retarded growth and lower milk production were also noticed. The lead contamination of cattle in the Mannsfeld and Freiberg areas is mainly due to automobile exhausts. In Poland the arsenic emission in the vicinity of a power plant fired with coal was measured to be 1 t/day. A maximum concentration of 69 micrograms As/cu m was repeatedly measured. Within a radius of 30 km an extensive bee kill was noticed. The government gives the problem of air pollution exposure of humans and cattle great attention. In the centers of the chemical industry such as Bitterfeld, Leuna, and Buna, the development of processes producing a low amount of pollutants is given high priority in the 5 year-plan. The SO2 and dust emission will be reduced by the erection of a new power plant serving the chemical industry in Bitterfeld operated with natural gas. Electrostatic precipitators are used to reduce pollution from the Buna power plant.

28441 **APTIC NO. 50050**

Mappes, Rolf

VARYING INFORMATIVE VALUE OF THE DUST CONCENTRATION AND THE BIOLOGICAL PARAMETERS ON LEAD-POLLUTED WORKING PLACES. *(Unterschiedlicher Informationswert der Staubkonzentration und der biologischen Parameter am bleigefaehrdeten Arbeitsplatz). Text in German. Staub, Reinhaltung Luft, 33(3):107-108, March 1973. 3 refs.*

Exposure tests including lead determinations in the air at a working place, lead content of blood and urine, and the determination of biological lead effects are discussed. The industrial and biological causes affect these parameters in a different way, and also the correlation between them. As a result of this, certain difficulties occur in the practical application of protective measures but specific indication ranges for each test are also obtained. Dust measurements are used for the local, temporal, and causal search of dust sources, as well as for planning measures to eliminate the dust development. Through this the installation of costly ill-designed exhaust systems can be avoided. Tests such as the determination of the aminolevulinic acid level or the coproporphyrin level are used for investigating whether a group of people is lead endangered or not, or, at high lead exposure for rounding up the results. The determination of the aminolevulinic acid dehydrase is used for epidemiological studies.

28442 **APTIC NO. 50345**

Matsumoto, Shoichi, Shintaro Ueda, Kazuhiro Hayashi, Fukutomi Hayashida, Hiroshi Tsukine, Nobuyoshi Ishii, and Tadafumi Hagiwara

ULTRA-MICRO MORPHOLOGICAL STUDIES OF RESTRUCTURING OF TRACHEA AND ALVEOLI SYSTEM. (REPORT NO. 12): THE EFFECTS OF OZONE (NO. 3). *(Kikanshi haiho-kei no saikochiku ni kansuru chobikeitaigakuteki kenkyu (dai 12-ho): Toku ni O3 no eikyo o chushin ni (sono 3). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1973. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

The basic reaction of the lung to ozone inhalation was observed in mice and rabbit experiments. The animals were made to inhale 10 ppm of ozone 2-4 hr daily for several consecutive days or twice a week, and they were examined by electron microscope. Initially, catarrhal inflammation of bronchial epithelium occurred, and then edemic transformation developed, blurring or shortening the cilia, or obliterating them completely. The squamatization of epithelium developed, edema enlarged in the area, and regeneration was recognized. In alveoli, the internal cells transformed and edama progressed, and septal interstitial inflammation extended into the cavity. The squamatized epithelium came off and exposed the base membranes. The diseased colonies transformed into fibrosis in many areas. The effect of ozone closely resembled that of sulfur dioxide, and had correlations with the inhalation time, frequency, concentration, and the susceptibility of individual body.

28443 **APTIC NO. 50171**

Nakajima, Y. and H. Oda

BIOLOGICAL EFFECTS OF NITROGEN OXIDES. (Chisso Sanka Butsu no Seitai Eikyo). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 2(2):92-100, Feb. 1973. 45 refs.

The chronic effects of nitrogen dioxide include disturbance of the cilia, mucosa, alveoli, and respiratory system which cause lowering of respiratory functions, chronic bronchitis, and pulmonary emphysema; lowering of resistance to respiratory infections which causes increased influenza and pneumonia; hyperplasia of lymphatic tissues and reactive proliferation of epithelial cells; and increased sensitation. The chronic effects of nitric oxide are possible action on the nervous system; lowering of partial pressure of oxygen in tissues; and effects on the whole body which are different from those of NO2 which are only on the respiratory system. Lung cancer is increasing in Osaka and Sakai where nitrogen oxides are increasing. There have been few studies of the effects of NO on man or animals due to experimental difficulties. Inhalation of high concentrations of NO causes cyanosis, convulsions, and paralysis in mice because of its direct invasion of the bloodstream to form methemoglobin and its direct effect on the central nervous system. Further epidemiological and experimental studies on the effects of NO and NO2 are needed.

28444 **APTIC NO. 50167**

Nakashima, Yasutomo and Hajime Oda

TOXICOLOGICAL EFFECTS OF NITROGEN OXIDES ON THE BODY. *(Chisso sankabutsu no seitai ni taisuru yugai sayo). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):1-9, Feb. 1973. 41 refs.*

Various data on nitrogen oxides pollution, emission sources, elimination methods, and toxicity in previously published material are reviewed. High concentrations of nitric oxide in the air are known to cause cyanosis, convulsions, paralysis, and the formation of methohemoglobin in blood. The body tolerance of NO is said to be 88 ppm, or 300 ppm. The affinity of NO with hemoglobin is strong, and mice blood exposed to 5-6 ppm of NO for 1 hr show the formation of NO-Hb. Nitrogen dioxide is known best as an eye irritant. An acute poisoning by relatively high concentration of NO2 causes acute bronchial pneumonia, congestive bronchitis, or emphysema, due to the easy penetration of NO2 into the lungs. The NO2 is less soluble than SO2 and is not as easily absorbed in the air passages as SO2; the unabsorbed NO2 can penetrate into the lungs. The chronic effects of low concentration NO2 are: bronchiole, chronic bronchitis, the inflation and shrinkage of cilia, epithelial abnormality of trachea, epitherial separation, hyperplastic foci, abnormal growth of bronchial lymph cells, penumonia (acute), enhanced mucous secretion of bronchiole, alveolar epitherial swellings, distention of alveoli, local emphysema, and abnormal proliferations resembling adenoma. Biochemical effects are further discussed. The data are insufficient regarding the multiple effects of various gases including NO2, but it is known that NO2 and SO2 multiplies the breathing resistance, and the simultaneous inhalation of NO2 and aerosol causes an increase in the air passage resistance.

28445 **APTIC NO. 50069**

Ogawa, Michio, Shuji Shimazaki, Noriaki Tanaka, Taku Ukai, and Tsuyoshi Sugimoto

THE FLUCTUATION IN THE AMOUNT OF CIRCULATING BLOOD BY ACUTE CARBON MONOXIDE POISONING. *(Kyusei issanka tanso chudoku ni okeru junkan ketsuekiryo no henka). Text in Japanese. Igaku no Ayumi (Progr. Med.), 84(4):201-202, Jan. 1973. 3 refs.*

Using eight dogs for the control group, and eight more for oxygen high pressure therapy (OHP), the effects of acute carbon monoxide poisoning were studied hematologically. Hematocrit, erythrocytes, circulating blood, and circulating plasma quantity were measured. For the control group, 0.6% CO was given for 30 min. For the OHP group, CO was given for 15 min, then pure oxygen under absolute pressure for 1 hour. Through the entire process, sodium lactose and Ringer s solution were given to the dogs at 3 ml/kg/hr. Among the control group dogs, carboxyhemoglobin reached 58.2%, increased with the completion of inhalation, and gradually decreased in normal air. The base excess decreased and then improved. The hematocrit index clearly rose during the inhalation of CO by as much as 24.3%. The circulation plasma drastically decreased and reached 22.4% decrease at the completion of inhalation. In the OHP group, the process of CO inhalation and the reaction were the same as the control group, 0but with the supply of OHP, the amount of hemocrit and the circulation blood returned completely to the normal level. There were significant differences between the OHP and control groups during the initial 10 min after the OHP administration, in the indexes of CO-Hb, hematocrit, circulation blood, and circulation plasma. An acute CO poisoning caused the seepage of plasma to increase drastically, this was caused by the enhancement of blood vessel permeability. This condition was reversible by the use of OHP.

28446 **APTIC NO. 50347**

Sato, Minoru, Sumiko Ishizu, and Masayasu Minami

EXPERIMENTAL STUDIES OF ACRYLONITRILE (AN) POISONING. *(Aburironitoriru (AN) chudoku ni kansuru jikkenteki kenkyu). Text in Japanese. Preprint, Japan Society of Industrial Hygiene, p. 396-397, 1973. (Presented at the Japan Society of Industrial Hygiene, Annual Meeting, 46th, April 1973, Paper 516.)*

Mature rabbits (3-4 kg in body weight) were exposed to 20 ppm acrylonitrile (AN) eight times in 57 days, 8 hr each time with an interval of 7 days; and the AN, thiocyanide (SCN) in the urine and oxygen partial pressure, cyanide, and SCN in the blood were measured. The AN in the urine increased from the third exposure and the SCN in the urine remained almost constant. The concentration of CN and SCN, and the oxygen partial pressure in the blood were higher after exposure than before exposure.

28447 **APTIC NO. 50106**

Schlipkoeter, Hans-Werner and Joachim Bruch

FUNCTIONAL AND MORPHOLOGICAL ALTERATIONS CAUSED BY EXPOSURE TO OZONE. *(Funktionelle und morphologische Veraenderung bei Ozonexposition). Text in German. Zentralbl. Bakteriol., Parasitenk. Infektionskr. Hyg:Abt. 1:Orig., Reihe B, 156(6):486-499, 1973. 49 refs.*

Female mice inhaled 0.86 ppm of ozone for 8 hr/day for 5 days/wk. For weeks 1-11, effects on the haemopoetic system were studied; after 6 mo, the resistance against infection with Plasmodium berghei was tested. The submicroscopic lung structure was tested after 10 mo. Up to the sixth week of experiments, a shift to the right was observed in the erythogramme, as shown by a statistically significant increment in acid resistance of the erythrocytes. After 6 mo, infection with Plasmodium berghei lead to increasing infestation with parasites and to higher mortality of ozone-exposed animals than controls. Electron microscopic examinations showed hyperplasia of epithelial cells and cell damage of the endothelium and principally of pneumocytes type I. Acute and subacute toxic effects were found.

28448 **APTIC NO. 50064**

Starikova, S. K., N. I. Zeleneva, and M. F. Lemyasev

THE ROLE OF FREE SILICA IN THE DEVELOPMENT OF CHRONIC DUST BRONCHITIS. *(O roli svobodnoy dvuokisi kremniya v razvitii khronicheskogo pylevogo bronkhita). Text in Russian. Gigiena i Sanit., no. 1:24-26, 1973. 2 refs.*

An epidemiological survey conducted among fireproof industry plant workers exposed to dusts with different free silica contents revealed a direct relationship between the dust free silica content and the incidence of dust-induced chronic bronchitis. A prolonged slimy cough over at least 2 years and a pneumotachometric index of less than one were regarded as relevant criteria for dust induced chronich bronchitis for the purpose of the survey. Very high free silica content of the atmospheric dust enhanced the hazards of chronic bronchitis even if the dust concentration, though exceeding the maximum allowable value of 1 mg/cu m, is relatively low. The bronchitis-inducing effect of dust is fortified by a variety of factors such as hard work, unfavorable microclimatic conditions, the presence of irritant gases, and smoking.

28449 **APTIC NO. 58371**

Takizawa, Yukio

EFFECTS OF FLUORIDE FROM ALUMINUM REFINING MANUFACTURE IN MAN-NAOETSU LITTORAL INDUSTRIAL AREAS. *(Niigata-ken Naoetsu rinkai kogyo chitai ni okeru fusso ni yoru jintai eikyo ni tsuite). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 9(4):339-346, April 1973. 21 refs.*

The chronic effects of fluoride pollution on the human health were examined thoroughly in the Naoetsu Coastal Industrial Area, near Mitsubishi Chemical Plants. Examinations were given on the general health, teeth, respiratory system, and urine on the primary level, and on the secondary level, blood, basic metabolism, cardiograph, and X-ray images were examined. The tests were started in Nov. 1970 and completed before Aug. 1972. The adult urine in two polluted areas had averages of 0.813 ppm and 0.759 ppm, and in control area 0.574 ppm. Among children, the averages were 0.391 and 0.408 ppm in polluted areas, and 0.180 ppm in the control area. The significant difference was greater among children than among adults. The frequency of incomplete or irregular enamel formation of teeth among children (3-15 yr) was 198/982 in polluted areas (20.2%), and 11/61 (18.0%) in he control area. For the examination of mottled teeth, all the malformation of enamel layers suspected of other factors than pollution were eliminated. Ten mottled teeth of a light degree and six advanced cases were recognized among 198 children with irregular enamel formation. There were five slight cases of mottled teeth in the control area. The ratio of cavities on permanent teeth was 69% in polluted areas and 82% in non-polluted area. The X-ray tests showed that 11 among 57 adults (19.3%) had abnormal bone formation. Symptoms like chronic bronchitis were complained of by 44 in polluted areas (5.2%) and one in nonpolluted area (1.6%). Some ventilation function impairment and lung infections were noted.

28450 **APTIC NO. 58316**

Toyama, Toshio

AIR POLLUTION AND ITS EFFECT ON HEALTH. *(Taiki osen to kenko ni taisuru eikyo). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), no. 10:1-9, March 1973.*

The history of air pollution in England, and a comprehensive review of previously published researches on the effects of various air pollutants on human health are presented. The pollutants discussed are: sulfur dioxide, nitric oxide, nitrogen dioxide, ozone, peroxyacetyl nitrate, aldehydes, hydrocarbons, carbon monoxide, lead, and asbestos, and the carboxyhemoglobin of smokers and non-smokers are also discussed. Asbestos is the source of the occupational disease asbestosis. But more recently, the wide use of asbestos spray as an insulator of city buildings, floors, tiles, walls, automobile brake shoes, and clutches has caused an abundance of asbestos particulates to float in the atmosphere of the cities. Various theories are advanced as to the theory of asbestos as a carcinogen, but the mechanism of chrysotile, the part of asbestos that is most harmful, is not clearly known. Traceable amounts of benzopyrene, nickel, and chromium in asbestos, or the asbestos body in the lungs broken down into particles may be acting as carcinogens. Maximum allowable concentration standards are also discussed.

28451 **APTIC NO. 59020**

Viswanathan, P. N., R. K. S. Dogra, R. Shanker, and S. H. Zaidi

PULMONARY FIBROGENIC RESPONSE OF GUINEA PIGS TO AMOSITE DUST. *Int. Arch. Arbeitsmed., vol. 31:51-59 1972. 14 refs.*

The fibrogenic response of amosite asbestos was studied over 300 days in the lungs of guinea pigs inoculated intratracheally with 75 mg of amosite. Histologically there was marked reticulin fibrosis, but the maturation into collagen was slow. Biochemical estimation revealed a significant increase of hydroxyproline and glycosamine. Total lung protein was higher in the amosite treated animals and was maximum at 90 days. The chief fibrogenic response even at 300 days consisted of thick reticulin fibers, arranged compactly corresponding to dust deposition, accompanied by thick reticulin network in the tracheobronchial lymph nodes. (Author summary modified)

1972

28452 **APTIC NO. 59166**

Sakai Municipal Health Examination Committee (Japan)

HEALTH EXAMINATIONS IN THE CITY OF SAKAI 1971 (THE SECOND REPORT). *(Sakai-shi kenko chosa hokoku (dainiho)). Text in Japanese. Sept. 1972. 154p.*

Comprehensive data are presented on the investigations of the health of the residents of Sakai, Osaka Prefecture. The sulfur oxide concentration in the coastal areas along Osaka Bay is decreasing, but the amount of suspended particulates has stayed at the same level for several years. As yet, many of these measurements have not passed the environmental standards. The chronic bronchitis morbidity according to questionnaires ranged between 6.88% and 5.38%. In all cases, the morbidity of males was twice as high as females. The district with the highest morbidity also showed the highest sulfur oxide measurements by the lead dioxide method for 1970 and 1971, and a high concentration of suspended particulates. In all areas, much higher morbidity rates were found (close to 9%) by actual medical examinations. The chronic bronchitis morbidity increased with the age, but no correlation with the period of residence in the area was found. Lung clearance irregularities were 16.8% in heavily polluted areas and 10.3% in less polluted areas. The morbidity of high blood pressure patients was 31.4%, higher among the aged. Among the 2310 persons who were given a chest X-ray, 18.1% had lung irregularities. Of the 38 who received minute examinations, most had tuberculosis, but there were three definite lung cancer cases, and one suspected lung cancer case. Among the 2022 persons who received a cardiograph, 529 or 26.16% had heart ailments. Ophthalmological tests showed that many people had congectivitis and trachoma.

28453 **APTIC NO. 58310**

National Academy of Sciences, Washington, D. C., Panel on Polycyclic Organic Matter

PARTICULATE POLYCYCLIC ORGANIC MATTER. *Environmental Protection Agency Contract CPA 70-42, Rept. APTD-0890, 374p., 1972. 836 refs.*

The biologic effects of particulate polycyclic organic matter (POM) were examined with respect to sources, atmospheric physics, chemical reactivity, chemical carcinogenesis, their metabolism, effects on man, and clinical and epidemiologic studies. The major technical sources include transportation, heat and power generation, refuse burning, and industrial processes. Particle size, surface area, and density affect their behavior in the atmosphere; POM are highly reactive: they are degraded in the atmosphere by photooxidation, reaction with atmospheric oxidants, and sulfur oxides. Most of the likely atmospheric reactions produce oxygenated compounds from the hydrocarbons. The theoretical and experimental aspects of carcinogenic aspects of POM are reviewed. The major effects of POM on man include cancer of the skin and lungs, non-allergic contact dermatitis, photosensitization reactions, hyperpigmentation of the skin, folliculitis, and acne. The mechanism of POM toxicity and its relationship to cigarette smoking are examined. Sampling, measuring, and analytical methods are mentioned.

28454 **APTIC NO. 50358**

Fournier, E. and A. Lecorsier

THE EFFECTS OF TOXIC FUMES GENERATED DURING WELDING OPERATIONS ON THE HUMAN ORGANISM. 1.) STUDY ON NITROUS GAS POISONING WITH EPR SPECTROMETRY. *(Effets des fumees toxiques produites par les operations de soudage sur l organisme humain. 1.) Etude de l intoxication par les vapeurs nitreuses par spectrometries RPE). Text in French. J. Eur. Toxicol., 5(6):343-347, Nov.-Dec. 1972. 4 refs.*

An attempt of in vitro labeling with a mixture of nitrogen dioxide and nitric oxide, easily able to form nitrous radicals in fresh pulmonary tissue, failed to permit detection in the living animal, even after freeze-drying, of the very characteristic EPR (electron paramagnetic resonance) spectrum of nitrogen oxides. Wistar rats and guinea pigs, exposed to 100 ppm of a NO2+NO mixture for 1 hr, were used for the experiments. The cellular sensibility to the toxic fumes was manifest well before the reaction reached an intensity high enough for determining a free radical concentration by the relatively low-sensitivity EPR spectrometry. Thus, the essential toxicological feature, the acute pulmonary edema due to nitrogen oxides, escapes detection by present EPR spectrometry.

28455 **APTIC NO. 50346**

Hattori, Masatsugu, Ryuhei Tateishi, and Yasutomo Nakajima

EXPERIMENTAL STUDIES ON THE CHRONIC EFFECTS OF AIR POLLUTION ON MICE TRACHEA AND ALVEOLI. *(Mausu kikanshi haiko-kei ni taisuru osen taiki no mansei eikyo ni kansuru jikkenteki kenkyu). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

The effects of a long-term exposure of mice to a low concentration of nitrogen dioxide and to the out-of-doors atmosphere were examined. The changes in the mice s bronchial and alveolar systems were studied patholo-histologically and by electron microscope. Hyper-plastic foci appeared on the epitherials of bronchiole on the mice which were exposed to 0.2 to 0.5 ppm NO2 for 1 mo, but a continual exposure for 3-6 mo resulted in their recovery to a normal state, and the edematic changes on the alveoli gradually brought the collagenization of elastic fibers. The group exposed to the out-of-door atmosphere for a year seemed to decrease their resistance to diseases; the cases of interstitial pneumonia increased and bronchial alveoli began to proliferate.

28456 **APTIC NO. 50036**

Ichioka, Masahiro

MODEL EXPERIMENTS ON ABSORBABILITY OF THE AIRWAY MUCOUS MEMBRANE OF SO2 AND NO2 GASES. *Bull. Tokyo Med. Dent. Univ., vol. 19:361-375, 1972. 31 refs. (Presented at the Japan Society of Air Pollution, Annual Meeting, 8th, Yokohama, Japan, Nov. 1967; Japan Society for Hygiene, Annual Meeting, 38th, Tokyo, Japan, April 1968; and Society for Pathophysiological Study of Airway, Meeting, 1st, Tokyo Japan, April 1968.)*

An airway model was constructed to compare the dynamic behavior of sulfur dioxide, nitrogen dioxide, and a mixture of sulfur dioxide-sodium chloride aerosol in the respiratory system. The model consisted of six glass tubes connected in series, with the last tube connected to two bubblers in series. The inner wall of each tube was lined with moistened filter paper. After 5 ppm SO2, 5 ppm NO2, or a mixture of 4, 8, or 10 ppm SO2 and submicron NaCl aerosol was passed through the glass tube-bubbler system for 15 min, the amount of SO2 or NO2 absorbed by each tube and bubbler was determined colorimetrically. The absorption rate of SO2 alone in the glass tubes exceeded 96%, with most of the SO2 being absorbed in the first tube. Only 0.1-3.7 micrograms SO2 reached the bubblers. In contrast, only 3.0 micrograms NO2 was absorbed in the first tube and 50-80% NO2 reached the bubblers. A considerable amount of SO2 was also absorbed in the first tube in the case of the SO2-NaCl aerosol mixture, but 11.08-17.34% of SO2 reached the bubblers. These results support the generally accepted hypothesis that the respiratory effect of SO2 develops immediately after absorption in the upper airway; that most of inhaled NO2 reaches the lungs and causes damage in lung tissues; and that SO2 can be absorbed by submicron aerosol and carried to deeper regions of the airway.

28457 **APTIC NO. 50317**

Iwakura, Mitsuru, Nobumi Mizutani, and Kabuhiko Ito

THE PROGNOSIS OF YOKKAICHI POLLUTION VICTIM PATIENTS--MAINLY ON MORTALITY. *(Yokkaichi kogai nintei kanja no yogo--toku ni shibo o chushin to shite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

In the Yokkaichi area, 1195 patients were designated by July 1972 as victims of air pollution. The prognosis for the last seven years were examined. Forty percent of the patients were less than 10 years of age, and 35% more than 50 years of age. Approximately 30% had bronchial asthma, chronic bronchitis, and asthmatic bronchitis. The present number of patients is 891; of the 304 who were eliminated from the list, 145 were cured, 66 died, 75 moved away, and 12 were removed for miscellaneous reasons. The causes of deaths were 20 respiratory disease cases (30.3%); 15 circulatory disease cases (22.7%), and 15 cancer cases (22.7%, lung cancer 6).

28458 **APTIC NO. 50006**

Kawai, Kiyoyuki, Kazuo Fukuda, Goyu Nozaki, and Yoshimi Matsumura

EXPERIMENTS ON INHALATION OF OIL COMBUSTION PRODUCTS. *(Juyu nensho seiseibutsu kyunyu jikken). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 46 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Reports for 1971). p. 3-10, Aug. 1972. 4 refs*

Experiments on the effects of air pollutants on the advancement of respiratory system diseases were conducted by using experimental rats and oil combustion gas. The rats were exposed to an average of 6.3 mg/cu m oil combustion products for 15 weeks. The most noticeable characteristics were the development of bronchiole and the initial stages of anthracosis. The bronchiole often accompanied epithelial irregularities such as small colonies of cell growths and the continuous proliferation of cilium epithelium proliferation into alveoli. In the lungs, the development of fibrosis and emphysema was recognized. When most particles in the combustion gas were eliminated by filters, anthracosis did not occur at all, and bronchiole cases were also slight; there was no epithelial abnormal development. These facts suggest that particle pollutants play an important role in the advancement of respiratory diseases.

28459 **APTIC NO. 50002**

Kuwabara, Noriyuki, Shozo Takayama, Haruo Sugano, Kiyoyuki Kawai, Kazuo Fukuda, and Goyu Nozaki

THE EFFECTS OF OIL COMBUSTION PRODUCTS ON LUNG CARCINOGENESIS BY 4NQO. (4NQO no haigan hassei ni taisuru juyu nensho seiseibutsu no eikyo). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu - Showa 46 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants - Reports for 1971). p. 11-18, Aug. 1972. 8 refs.

Bases on the principles of conditioned carcinogenesis, experiments were conducted on the effects of oil combustion products on the lung cancer induced by 4-nitroquinoline 1-oxide (4NQO). Tumors were induced by a 15-week period injections on 9 week old rats. The experimental group was divided into two groups, those who inhaled pollutants before the injection period (A), and those who inhaled after the injection (B). They were further divided into sub-groups by various concentrations of pollutants. The control groups included the pollutants-only group, the 4NQO administration- only group, and the completely free group. In group A, broncheo alveolar cells were noted in groups which inhaled high concentration combustion gas. In group B, there was no tumor in the lungs, but 1/5th of the rats showed some increase of broncheo-alveolar cells. Light cases of anthracosis (carbon deposits) were noted, but had no direct connection with the tumors. The control groups showed no lung tumors. However, all the rats that received the 4NQO injections showed myosarcoma. The prevalence of epidermal tumors prevented satisfactory experimental results. Most of lung tumors appeared in the peripheral parts of the air ducts. In the small arteries in the tumor areas, the swelling of tunica media and spasmus appeared.

28460 **APTIC NO. 50224**

Lob, M., M. Guillemin, and M. -N. Valloton

USE OF MODERN PARAMETERS TO EVALUATE THE BIOLOGICAL EFFECT OF LEAD ON SUBJECTS WITH OCCUPATIONAL AND NON-OCCUPATIONAL EXPOSURE. *(Interet des parametres modernes pour l evaluation de l action biologique du plomb chez les sujets exposes et non exposes professionnellement). Text in French. Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), 33(12):621-626, Dec. 1972. 16 refs.*

Blood lead, delta-aminolevulinic acid (ALA), and delta-aminolevulinic acid dehydrogenase (ALA-D) were investigated in cable factory workers with occupational exposure to lead but without clinical and hematological symptoms of lead poisoning (group 1), in traffic policemen (group 2), in policemen charged mostly with administrative duties (group 3), and in schoolboys from a city (group 4) and from a rural area (group 5). The average age of the subjects in each group was 52, 30.4, 37, 34.4, and 15 yrs. The averages of the blood lead levels for each group were 75.33, 18.625, 21.23, 20.24, 22.15, and 18.90 micrograms/100 ml, respectively. The urine ALA levels in the groups were 31.7, 3.07, 3.19, 3.15, 3.06, and 2.28 mg/l, respectively. The corresponding ALA-D activities in the groups were determined to be 2.45, 19.35, 16.08, 17.32, 24.82, and 31.29 units, respectively. The correlations between the blood lead levels and log ALA-D, insignificant for groups 2 and 4, were significant with factors of -0.542, -0.495, -0.6958, and -0.8661 for groups 5, 4+5, 2+3+4, and all five groups. Influence of age of the subjects (cumulation of lead in the organism) on the ALA-D activity is hypothesized.

28461 **APTIC NO. 50315**

Mitsui, Kenji and Masahiro Yanagisawa

THE EFFECTS OF AIR POLLUTION AND SMOKING ON ARTERIAL BLOOD HEMOGLOBIN. *(Domyakuketsu hemogurobin ni oyobosu taiki osen to kitsuen no eikyo ni tsuite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), no. 11:73, 1972. (Presented at the Meeting on Air Pollution, April 5, 1972.)*

Thirty beds were installed in the new clean air ward of the Kawasaki General Hospital. All the patients in this ward were forbidden smoking. Their blood hemoglobin levels were measured and were compared with those of patients from other wards. The patients who were exposed chronically to low-concentration carbon monoxide showed a tendency to prolong the retention of CO in the blood.

28462 **APTIC NO. 50231**

Paulet, G. and S. Desbrousses

ON THE TOXICITY OF CLO2. *(Sur la toxicologie du CLO2). Text in French. Arch. Maladies Profess. Med. Travail Securite Sociale (Paris), 33(1-2):59-61, 1972.*

The toxicity of chlorine dioxide was studied in Wistar rats inhaling 1 ppm of ClO_2 for 5 hr daily 5 days/wk over 2 mo. Vascular congestion with a minimum degree of peribronchial edema in the lungs, and absence of parenchymal alterations in the lung and liver were determined on autopsy. The decreases in the erythrocyte and leucocyte counts were not significant. No retardation of the growth of the test animals was observed.

28463 **APTIC NO. 50033**

Sinn, W.

PHYSIOLOGICAL AND PHYCHOPHYSICAL ASPECTS OF EXPERIMENTS TESTING THE EFFECT OF AIR POLLUTANTS. *(Experimentalphysiologische und psychophysische Aspekte zur Wirkung von Luftfremdstoffen). Text in German. Schriftenreihe Ver. Wasser-, Boden-Lufthyg. (Berlin), no. 38:299-312, 1972. 4 refs.*

Physiological experiments yield results from which mathematical relations can be derived which not only outline threshold concentrations quantitatively but also supply a measure for individual sensitivity. Slow changes of the environment which trigger the adaptive mechanism of the human organism as in the case of air pollution require the inclusion of this mechanism in all reaction physiological and toxicological examinations. In this connection not every reaction to an exogeneous pollutant may be termed negative. It may very well be a sign of adaptation or resistance. The wide field of psychic reactions is illustrated by an example of a group of students who wished to participate in experiments testing the effects of exposure to automobile exhausts. The students were not told whether they belonged to the control group or exposed group, nor were they told to which concentrations they were exposed. Interestingly, one student collapsed who belonged to the control group, while those exposed to an atmosphere containing 50 ppm CO measured better values than prior to exposure. This shows that also the psychic condition must be taken into consideration.

28464 **APTIC NO. 50042**

Suzuki, Hiroshi

THE FREQUENT OCCURRENCE OF A SPECIFIC CORNEAL FOREIGN BODY IN NIIHAMA CITY. *(Niihama chiku ni mirareta kakumaku ibutsu no tahatsurei). Text in Japanese. Sumitomo Sangyo Eisei (Sumitomo Bull. Ind. Health), no. 8:61-64, April 1972.*

About 60 cases of patients with corneal foreign bodies were reported in the Niihama area of Ehime Prefecture between Sept. 1969 and July 1971. Most patients came to the hospital after two days to a week of discomfort. Examinations by scanning electron micrososcopy and X-rays revealed white particles of 50-100 micron in diameter with the external appearance resembling lava, and containing silicon, oxygen, titanium, potassium, iron, and aluminum. Most cases had occurred while the patients were driving a car or riding a motorcycle or a bicycle. Settling particles of the same white substances were frequently noted in the area during the same period. The emission sources of these particles have never been identified, nor the nature of the substance. However, after Aug. 1971, these particles disappeared completely.

28465 **APTIC NO. 50044**

Suzuki, Takeo

THE EFFECTS OF OXIDANTS ON THE HUMAN BODY. *(Okishidanto-to no jintai ni oyobosueikyo ni kansuru kenkyu hokokusho). Text in Japanese. Japan Environmental Agency, 120p., Aug. 1972. 307 refs.*

As the first step toward a comprehensive study of the effects of photochemcial pollutants on the human body, the compilation of previously published data was attempted. As a cross section investigation, outdoor workers of the police and Japan Telephone and Telegraph corporation were given a questionnaire and partial examination of respiratory functions. Daily eye irritation was compared in summer and winter. The questionnaire investigation and the respiratory function examination were limited in scope, and clear-cut pictures were not obtained. In Tokyo, 26.7% of the indoor workers and 28.6% of outdoor workers said they never experienced eye irritation; 66.7% of the outdoor workers and 46.7% of the indoor workers reported frequent eye irritation during the past 12 months. In Osaka 10% reported they had never experienced eye irritation, and 60% reported frequent eye irritation during the past 12 months. The questionnarie responses by the policemen did not show a clear relationship between polluted areas and the subjective symptoms of photochemical smogs. The rates of complaints about sore throat, eye irritation and dry throat were high, but further studies are necessary for clarifying the degree of traffic and pollution. The descriptions of the initial symptoms of photochemical oxidants are mostly subjective or vague. It was felt that data on objective, external determination of symptoms by an exposure to a given concentration of oxidants were necessary.

28466 **APTIC NO. 50164**

Suzuki, Takeo, Soroku Yamagata, Riichiro Mikaim, and Shigeru Nagaoka

AIR POLLUTION AND CLINICAL STUDIES. *(Taiki osen to rinsho). Text in Japanese. Nihon Iji Shinpo (Japan. Med. J.), no. 2525:3-13, Sept. 1972.*

Epidemiological studies and methodology, health aspects, Yokkaichi asthma, photochemical smog, and the need for the cooperative teamwork between epidemiologists and clinicians are discussed. Various symptoms are carelessly diagnosed as asthmatic bronchitis or asthma, and different physicians and city health organizations use these terms differently. Asthmatic bronchitis is an infant disease which has nothing to do with air pollution. In the heavily polluted areas of Yokkaichi, approximately 10% of the population is effected by sulfur dioxide and other pollutants; yet, 90% have not shown any clinical symptoms of respiratory disorder. This fact alone suggests the complexity of individual factors, individual differences in susceptibility, resistance, and immunity of the mucous membranes of human air passages. The morbidity of asthmatic patients since 1960 has been 66%; chronic bronchitis 23.7%; and emphysema 10.3%. Among the asthmatic patients, only 25% came from asthmatic families, and only 20.8% reacted allergically to house dusts. But the hematological examinations clearly showed allergic reactions. Asthmatic patients slightly increased since 1963, but there has been no increase in the number of chronic bronchitis patients. It could be surmised that all the people with susceptibility have already become ill, or the human respiratory system has acclimated to the environment.

28467 **APTIC NO. 50003**

Takeda, Susumu and Hiroshi Yamagiwa

EXAMINATIONS OF LUNG CANCER AUTOPSIES OF INHABITANTS IN POLLUTED AREAS OF YOKKAICHI. *(Yokkaichi Taiki osen chiku kyojusha no haigan bokenrei no kento). Text in Japanese. In: Taiki Osen ni Yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 46-nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Reports for 1972). p. 60-64, Aug. 1972. 3 refs.*

In the heavily polluted areas of Yokkaichi, the mortality from lung cancer began to increase in 1966. However, the known aromatic hydrocarbon carcinogens such as benzopyrene are not particularly concentrated compared to the control areas. Reviewing four recent cases of autopsies of suspected of lung cancers, three showed definite development of lung cancer. They were all residents of highly polluted areas of Yokkaichi. In two cases, the formation of pavement epithelium on the bronchial mucous membranes was extremely advanced and covered a large area. This phenomenon was not recognized in the past cases of autopsy of the lung cancer. In all cases, emphysema, carbon particle deposits (anthracosis) the formation of pavement epithelial, epidermoid carcinoma, and chronic bronchitis were recognized. Whether the formation of the pavement epithelium is directly caused by air pollution or not was not confirmed due to the insufficient number of cases.

28468 **APTIC NO. 50007**

Takemoto, Kazuo

AIR POLLUTION OF THE LUNGS OF DOGS AND BIRDS. *(Kenhai oyobi chohai no taiki osen). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 46 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Reports for 1971). p. 19-23, Aug. 1972.*

The effects of air pollution on the lungs of dogs and birds were histopathologically studied. A total of 705 dogs (108 in Tokyo, 574 in Aichi Prefecture rural areas, and 23 in Yokkaichi) were examined. The formation of pavement epithelium in the pharynx and bronchi was frequent, but the colonies were limited in areas and the proliferation into other parts was seldom and gradual. There was no example of proliferation through the base membrane. The formation seemed to be the after effect of an inflammation, and had much to do with the increase of mucous secretion. Many cases accompanied the destruction of epithelium. The cause for the increase of mucous secretion should be studied in relation to pollutants. There was a strong relationship between the formation of lung epithelium and the lung pollutant deposits (anthracosis); however there seemed to be no direct relationship between the bronchial and pharynx pavement epithelium formation and the pollutant deposits of the lungs. This may simply indicate that the formation of the lung epithelium irregularities require a high degree of pollution over a long period. A total of 153 birds which died in the Zoological Garden of Tokyo were examined. Most lung deposits were carbon particles. The degree of the lung deposits and the bird age was proportionate. The degree of deposits was lower among the birds raised indoors. Seventy percent of the birds which were raised out-of-doors for more than three years showed a high degree of deposits in the lungs.

28469 **APTIC NO. 50004**

Takragi, Yoshitsugu, Kiyomi Mukubo, Sumihisa Matsuno, Chieko Matsuno, Ryuji Miyazaki, and Yuzo Yamada

STUDIES ON CARCINOGENS IN MICE LUNGS, NO.3: PATHOLOGICAL INVESTIGATIONS OF SILICIC ANHYDRIDE, ASBESTOS, CARBON PARTICLES, AND 20-METHYL CHOLANTOLUENE AS CARCINOGENS IN MICE LUNGS. *(Taiki osen busshitsu-chu ni fukumareru kakushu bushitsu ni yoru daikoku-nezumi-hai ni okeru hatsugan ni kansuru kenkyu, (sono 3): Musui keisan, ishiwat, tanso funjin, 20-mechirukorantoren ni yoru daikoku-nezumi-hai ni okeru hatsugan no gyorigakuteki tansaku). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 46 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Report for 1971). p. 45-59, Aug. 1972.*

The tumor formation frequency and the relationship among 20-methyl cholantoluene, (MC), silicic anhydride (silicon dioxide) asbestos, and carbon particles were studied by animal experiments. All particles were diluted to 40 mg/ml by biological saline water, and they were singly or in combination poured into the lungs of mice through vinyl tubes. Each mouse was given 2000 units of penicillin. Some mice from each group were killed after 12 weeks, 36 weeks, and 48 weeks, and they were observed pathologically, visually, and microsopically. With the group with 5 g of MC and 10 mg of SiO2, examinations were conducted after periods of 1, 2, 4, 8, and 12 weeks. In the group that was given a MC-SiO2 mixture, the 4 week and 8 week groups showed 57.1% formation of visible tumors; in 12 weeks, the tumor development ratio was 7.4%. The formation of flat epitherial tumors was seen in all groups, and 100% appearances in the cases of 48-week examinations for MC-SiO2, MC-asbestos, and MC-Ca mixture groups. In all experiments the group that was given the mixture of MC and SiO, showed the highest frequency of tumor development; there was a total of 83.3% tumor development.

28470 **APTIC NO. 50329**

Tat, M. and C. Simionescu

FUNCTIONAL RESPIRATORY CHANGES BY THE INFLUENCE OF CONCENTRATIONS OF CEMENT, MICA, MARBLE, ASBESTOS, AND COAL DUST. *(Modifications fonctionnelles respiratoires sous l influence de concentrations variees de poussieres). Text in French. Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), 33(10-11):553-558, Oct.-Nov. 1972. 13 refs.*

Different groups of 20-30 year-old subjects were exposed to 35 mg/cu m concentrations of cement, marble, and mica dusts; 10 mg/cu m concentrations of coal dust; and 10 mg/cu m concentrations of asbestos dust. More than 70% of the dusts used were in the submicronic range. Spirographic values, respiratory volume, percentage of oxygen consumption, and carbon dioxide expiration were measured at rest, during physical load at a rate of 450-500 kg over 5 min, and after 10 min rest. Exposure to any of the dusts investigated caused an increase in the oxygen consumption during load. The reduction of the respiratory volume, relatively small at rest, because considerable during rest after the physical load. These effects were most pronounced in subjects exposed to 3-10 mg/cu concentrations of mica and asbestos dusts.

28471 **APTIC NO. 90032**

Wagner, H. M.

THE EFFECTS OF INDIVIDUAL COMPONENTS OF AUTOMOBILE EXHAUSTS ON MAN AND ANIMAL. *(Wirkungen von Einzelkomponenten aus Kraftfahreug-Abgasen auf Mensch und Tier). Text in German. Schriftenreihe Ver. Wasser-, Boden Lufthyg. (Berlin), no. 38:313-325, 1972.*

A review of properties and effect of the major pollutants in automobile exhausts, namely carbon monoxide, oxides of nitrogen, hydrocarbons, and lead is given. Of all pollutants in the exhaust gas, CO reaches the highest concentrations. This is the reason that the most is known about CO. The total emission of CO in West Germany in 1969 was 8 million tons. In the atmosphere above cities the average CO concentration is 10 to 20 ppm. The total emission of NOx in 1969 was 2 million tons. The concentration of NOx in West Germany presently is 0.05 to 0.1 mg/cu m. Approximately 90% of the NOx are retained in the respiratory tract. Concentrations of 1.6 to 2 ppm nitrogen dioxide lead to an increase of the airway resistance. The pressure of the arteria pulmonalis increased in humans and animals upon exposure to NO2 concentrations below the maximum allowable working place concentration. Long-term exposure of NO2 may lead to chronic bronchitis. Automobiles emitted about a million tons of HC in 1969. The composition of the HC in automobile exhausts depends on the engine type, the mode of driving, and the fuel composition. Of the 170 components identified in automobiles to date, 160 are HC derivatives. Of these 40 are aromatic HC. In order to reduce the high lead emission by automobiles, a law has been introduced in 1972 reducing the lead level in the fuel to 0.0.4 g/l of Pb.

28472 **APTIC NO. 50005**

Yamanaka, Noboru

EXAMINATIONS OF THE RELATIONSHIPS BETWEEN AIR POLLUTION AND FIBROSIS IN THE LUNG. *(Taiki osen to hai senbu seniso tono kanrensei ni tsuite no kento). Text in Japanese. In: Taiki Osen ni yoru Jinhai Osen no Byori Soshikigakuteki Kenkyu -- Showa 46 nendo Hokoku (Histopathological Studies of the Human Lung Affected by Air Pollutants -- Reports for 1971). p. 34-44, Aug. 1972. 1 ref.*

In order to see the relationship between air pollutants and the development of peak fibrosis symptoms of the lung cases, conditions of carbon deposits, and the number of peak fibrosis cases were compared between Tokyo St. Luke Hospital and the lung autopsies conducted in unpolluted are of Chiba Prefecture. There were only 20 cases for the control area and further studies are necessary. The carbon deposits (anthracosis) in the lungs were studied by the surface appearance and the appearances of cross sections of the lungs. The degrees of carbon deposits were classified into Ia, Ib, II, III, and IV, the last being the heaviest deposit cases. In Tokyo, out of 150 cases examined, 28.7% showed degree II; 18%, degree III; and 4% degree IV. The greatest carbon deposits were found among the age groups of 50s, 60s, and 70s. In the control area, 10 cases out of 20 were degree II, and three were degree III. A relatively high number of deposit cases were found in the age groups 50 and 60 in both Tokyo and the control area. The cases of peak fibrosis were 56, or 37.3%; a high percentage of peak fibrosis was found in the age groups 50 to 70, 63% belonging to the age group of 70s. A high percentage of parapleural fibrosis cases was found in patients in their 50s. Four cases of peak fibrosis were found among the 20 examinees in the control area. Out of 150 cases in Tokyo, 20 had lung cancer.

1971

28473 **APTIC NO. 50308**

Wisconsin Medical Coll., Milwaukee, Dept. of Environmental Medicine

RESEARCH STUDY TO DETERMINE THE RANGE OF CARBOXYHEMOGLOBIN IN VARIOUS SEGMENTS OF THE AMERICAN POPULATION. (ANNUAL REPORT). *Environmental Protection Agency Contract CPA 70-71, Coordinating Research Council Proj. CRC APRAC CAPM-8-68, MCOW-ENVM-COHb-71-1, EPA-R1-73-004, 29p., Sept. 30, 1971.*

NTIS: PB 210021

The range of carboxyhemoglobin in various segments of the American population was investigated using approximately 17,500 blood samples and over 1000 breath samples from donors in Milwaukee, New York, Miami, St. Louis, Chicago, Washington, D. C., Detroit, New Orleans, Denver, Hawaii, San Francisco, Seattle, and Anchorage. The survey methodologies, analytical procedures, statistical analysis, and some results are reviewed. Of all the variables studied, cigarette smoking had the greatest effect on COHb level. Based on non-smokers data from the Milwaukee survey, COHb levels as compared to age, weight, and residence variables showed no significant trends. Significant differences were determined for certain groups of sex, race, and health status. Hemoglobin levels for males were significantly higher than for females. In the non-smoking group, the strongest variables were time of day, weight, and hemoglobin. The day-to-day differences on one person were larger than the differences in measurements between people.

28474 **APTIC NO. 98318**

Niigata Prefectural Research Inst. for Public Nuisances (Japan)

NIIGATA PREFECTURAL HYGIENIC AND PUBLIC NUISANCE LABORATORY ANNUAL REPORT. *(Niigata-ken eisei kogai kenkyusho nenpo). Text in Japanese. Rept. 6, p. 40-41, 1971.*

The measurements of sulfur dioxide, suspended particulates, soot, fluoride, automotive exhaust gases, fluoride ion, nitric oxide, nitrogen dioxide, and hydrogen fluoride, for Niigata Prefecture are presented. The fluoride and sulfur content in 426 samplings of cedar leaves are compared. The leaves from the most damaged areas showed significant differences of F content by age; the greatest amount was found in new leaves, followed by 1 year leaves, 2-year leaves, and dead leaves. But in the areas with slight damages, there was no significant difference in the age of leaves and the amount; slightly higher F content was found in dead leaves. The fluoride ion content in urine was measured from the samplings of 958 children in polluted areas and 61 children in non-polluted areas. The total average in non-polluted areas was 0.17 ppm, and that of the polluted area was 0.43 ppm. The average of the infants in the polluted areas was 0.38 ppm, elementary schoolchildren 0.41 ppm, and junior high school pupils 0.38 ppm.

28475 **APTIC NO. 98255**

BeBias, Domenic A., Newton C. Birkhead, Chandra M. Banerjee, and M. H. F. Friedman

THE EFFECTS OF CHRONIC EXPOSURE TO LOW LEVELS OF CARBON MONOXIDE OF THE CARDIOVASCULAR SYSTEM OF DOGS. II. EXPOSURE TO 50 AND 150 PPM CARBON MONOXIDE. *Thomas Jefferson Univ., Philadelphia, Pa., Dept. of Physiology, Coordinating Research Council Contract CRC-APRAC, Proj. CAPM-4-68, 76p., Dec. 1971. 1 ref.*

NTIS: PB 212958

The effects of chronic exposure to 50 and 150 ppm of carbon monoxide on the cardiovascular system of dogs were studied. The experimental procedures, pathology, histopathology, enzyme changes, hematology, and electrocardiograph changes are examined. Exposure to 150 ppm CO induced recognizable changes in the red cell related parameters and myocardial ischemia when the coronary circulation was impaired. The chronic no-effect level of CO was experimentally established at somewhere between 100 and 150 ppm.

28476 **APTIC NO. 99168**

Kawaraya, Toshio, Kosuke Haruki, Kinuko Tomita, and Michio Oka

CARCINOGENIC HYDROCARBONS IN THE ATMOSPHERE OF OSAKA. *(Osaka-shi no taikichu hatsuganseі tanka suisoryo). Text in Japanese. Osaka-Shiritsu Eisei Kenkyusho Hokoku (Rept. Osaka City Inst. Hyg.), no. 34:123-124, 1971.*

The toxic intensity (or carcinogenic intensity) of multinuclear aromatic hydrocarbons was examined by determining the lethal dosage for Paramecium Caudatum (P.C.), a common primitive insect. The lethal dosages of various HC for P.C. were determined under the influence of ultraviolet irradiation, and the lethal dosage of tar element in suspended particulates for P.C. was measured. The P.C. specimens were cultured in a lettuce culture. Hydrocarbons were dissolved in a quantity of acetone diluted by the same amount of pure water. Then 0.1 ml of HC solution and 0.9 ml of P.C. cultivating liquid were mixed in a test tube; 10-30 P.C.s were taken out and the lethal ratio was examined by a microscope. The P.C. cultured for 1 hr in HC solution were taken out, and the lethal ratio and time under UV irradiation were examined. The effects of benzo(a)pyrene, 1,12-benzperylene, chrysene, perylene, and coronene were studied, but the lethal ratio was zero in any HC within the cultivation time. The effect of 0.4 UV increased the lethal ratio in about 35 min, and in 60 min, the ratio was 100. The photodynamic bioassay (UV sensitization to HC) in 10 to the -7th power g/ml of BaP increased the lethal ratio immediately, and the ratio rose to 100 in 7 min. The lethal time 90% was, in the order of greatest reaction, coronene, perylene, chrysene, 1,12-benzperylene, and BaP.

28477 **APTIC NO. 98212**

Oka, Michio, Shigeo Yamaoka, and Osamu Fukase

THE TRACEABLE METAL QUANTITY IN THE AIR AND THE HUMAN HAIR. *(Taiki-chu oyobi tohatsucho biryo kinzokuryo ni tsuite). Text in Japanese. Osaka Shiritsu Eisei Kenkyusho Hokoku (Rept. Osaka City Inst. Hyg.), no. 34:132-133, 1971.*

The metal content in the hair of schoolchildren and in the atmosphere of the areas where the children reside were measured and the relationship was studied. Samplings were taken from the fifth grade boys of four schools in Osaka, one each from industrial and residential areas and two schools from commercial areas, in Nov. 1970 and March 1971. The air samplings were taken by hi-vol samplers with glass fiber filter paper, between April 1970 and March 1971. The hair was washed in a neutral detergent and hot water, dried, and burned to ashes; it was dissolved in pH 3.5 ammonia water, extracted by APDC-MIBK, and analyzed by atomic absorption spectrometry. Lead, copper, and cadmium were measured. The copper content in the hair was the greatest, followed by lead and cadmium, and in the air, in the order of Pb, Cu, and Cd. There were no significant differences between schools for the first test, but for the second, Pb content in the hair of the children in the industrial area was 12.7 micrograms/g and that in the residential area was 8.8 micrograms/g. The children in the residential area had relatively large quantities of Cu. The Pb content in hair and the atmosphere showed a good correlation. There was no clear indication concerning Cu and Cd.

1968

28478 **APTIC NO. 98294**

Hansell, Margaret Mary Mollison

A STUDY OF HISTOLOGICAL AND CYTOLOGICAL CHANGES IN MOUSE TRACHEAL EPITHELIUM DUE TO OXIDATIVE AIR POLLUTANTS. *California Univ., Riverside, Dept. of Biology, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., Aug. 1968, 113p. 129 refs.*

Ozone and peroxacetyl nitrate induced histological and cytological changes were studied in incubated tracheal epithelium from 1 to 3 week old Swiss mice. Many cells were killed outright upon exposure The epithelial layer was flattened, the lamina propria became swollen, and the epithelium tended to become separated from the underlying connective tissue. The cilia lost their uniform orientation and were reduced in number. Within 24 hours of the treatment, the amount of endoplasmic reticulum in the cells was reduced greatly in amount. Some regeneration of the epithelium was noted after 4 days in culture. The direct action of the peroxacetyl nitrate and ozone appears to be on the cellular membrane. In the intact animal the damage to the tracheal epithelium should leave the animal susceptible to infection and the irritation by carcinogens due to damage of the pulmonary clearance system.

EFFECTS-PLANTS AND LIVESTOCK

1973

28479 **APTIC NO. 50105**

Koehler, W.

TENTATIVE QUANTIFICATION OF AGRICULTURAL AND FORESTRY FUNCTIONS NOT REFLECTED BY PRODUCTION FIGURES. *(Versuch einer Quantifizierung der Fuktionen der Land- und Forstwirtschaft, die nicht im Produktionsertrag zum Ausdruck kommen). Text in German. Allgem. Forstztg., no. 28:75-76, Jan. 1973.*

Quantification of agricultural and forestry functions not reflected by production figures is attempted. Quantification of such effects and functions as source of employment, equalization of the natural water cycle, protection, recreational attraction, oxygen production, noise abatement and dust filtering especially by forests, is hardly possible due to a lack of relevant data on otherwise complex interrelations. Forests and open spaces are important oxygen producers. A forest area of 1,000,000 ha produce some 15,000,000 tons of oxygen yearly, while the corresponding figure calculated for a comparable open space area is 5,000,000 tons. Forests also contribute to noise abatement and dust filtration. A 50 to 100 m broad forest belt is able to reduce the atmospheric particulate content by 50%. Leafy, especially beech, trees are more efficient in their filtration effect than conifers.

1972

28480 **APTIC NO. 50157**

STUDIES ON THE MEASUREMENT METHODS OF DAMAGE TO AGRICULTURAL PRODUCE BY AIR POLLUTION. *(Taiki osen ni yoru norin sakumotsu higai no sokutei hoho ni kansuru kenkyu). Text in Japanese. Nogyo Gijutsu Kenkyusho Hokoku A, 1972:56-60, Sept. 1972. (Presented at the Conference on Agriculture, Forestry, and Marine Product Technology, Japan, 1972.)*

Studies were made on the effects of air pollution on plants and agricultural produce, starting in 1968. In 1971, the research programs included the relationship between the absorption of toxic gases in plant leaves and the wind velocity, sunshine, and the conditions of the leaf surfaces; the distribution of sulfur in the plant which has absorbed sulfur dioxide; the morphological analysis by equipment of the damaged plants and radiochemical studies; the effects of sulfur dioxide on the growth of vegetables, fruit, and plants; the sulfur content in the leaves; the explanation of the damage mechanism and metabolic changes of plants exposed to SO2; the analysis of plant damages by hydrogen fluoride and ozone and the distribution of these pollutants in the plants. The seasonal fluctuation of susceptibility of plants to pollutants varied by various species. The susceptibility of certain kinds of adhesive mosses proved useful in measuring the degree of air pollution. The distribution pattern of the moss proliferation throughout city was used as an indicator of SO2 pollution, and a map was formulated. The plants do not respond to automotive exhaust gases as clearly as they do to SO2.

28481 **APTIC NO. 50035**

Huelsenberg, C.

THE EFFECT OF AIR POLLUTION ON CULTIVATED PLANTS. *(Wirkung von Luftfremdstoffen auf Kulturpflanzen). Text in German. Schriftenreihe Ver. Wasser-, Boden-Lufthyg. (Berlin), no. 38:281-284, 1972. 4 refs. (Presented at the Conference on Environmental Pollution and Public Health Service, Berlin-Dahlem, West Germany, March 13-18, 1972.)*

Plants are good indicators for occurring air pollutants such as sulfur dioxide, nitrogen oxides, organic solvents, automobile exhausts, and halogen compounds. The lichen species parmelia physodes is used for indication of the smallest concentrations of SO2 in the atmosphere, gladiolus spec., lilium spec., iris germanica, hypericum perforatum, and berberis vulgaris are indicators of fluorine containing air pollutants. Plant damage by air pollutants increases with the light intensity. Presently 50,000 hectare of forest are air pollution injured in North Rhine Westphalia. In the center of the Ruhr Valley where considerable amounts of sulfur dioxide and fluorine are emitted, firs have been exterminated. In recent times hydrogen chloride has been added to the major pollutants. Last year exposure tests with cultivated plants were begun in the experimental fields of Hattersheim near Frankfurt/Main. Carrots were exposed to between 0.3 and 0.4 ppm HCl for 20 or 35 hours, 10, 14, or 18 weeks after sowing. Carrots affected by the pollutant at an early growth stage. The total chloride concentration in the carrot weed was 16 and 21 mg Cl/g dry substance. The chloride concentration in the peel was lower than in the center of the carrot. Potatoes stored more chloride inside than the peel. Spruces which were likewise exposed showed no damage.

28482 **APTIC NO. 50163**

Kuribayashi, Shigeharu

INFLUENCE OF AIR POLLUTION WITH FLUORIDE ON SERICULTURE. *(Fukkabutsu ni yoru taiki osen no yosan ni oyobosu eikyo). Text in Japanese. Nihon Sanshigaku Zasshi (J. Sericult. Sci. Japan), 41(4):316-322, Aug. 1972. 86 refs.*

The effects of fluoride on mulberry leaves and silkworms are reviewed. Fluorine emission sources are discussed. The damage symptoms of mulberry plants vary by degrees, but main characteristics include tip burn, chlorosis of leaves from the edges toward the center, withering, warping, and dropping of leaves. Mottling, banding, and the appearance of shininess or a white powder-like substances are some other symptoms. The normal F content in mulberry leaves is 10-20 ppm. When exposed in 1.5 ppb hydrogen fluoride for 118 hr, no visual damage appears; but further exposure for 212.6 hr will cause visual damages. For a slow accumulation of F, the leaves show a relatively high tolerance, and the F content in the leaves can be as high as 273 ppm when the damages begin to show. When exposed to 5 ppb gas for 40.6 hr, visual damages appear, and the F content can be as high as 213 ppm. A vast variety of damages and concentrations are reported. Silkworms can be damaged either by the consumption of high concentrations of the F in mulberry leaves, or by accumulation of F by consumption of low concentrations of F over a long period. The damage mechanism is not clear, but F seems to suppress the enzyme function and disrupt the respiration of the body system. An acute poisoning usually causes inactivity and death. Chronic effects can delay the growth of the silkworm, or cause lack of sleep, softening of the body, decrease of weight, formation of knots, black mottles, or virus. The tolerance of silkworms for F is usually in the range of 24 to 40 ppm (in dry mulberry leaves).

28483 **APTIC NO. 50034**

Mathe, P.

THE IMPORTANCE OF GREEN BELTS AND PLANTS IN THE CITY FOR THE HEALTH OF MAN. *(Die Bedeutung von Gruenraeumen und Pflanzen in der Stadt fuer die Gesundheit des Menschen). Text in German. Schriftenreihe Ver. Wasser-, Boden-Lufthyg. (Berlin), (38):285-298, 1972. 53 refs*

Green belts in cities are important for recreation, dust absorption oxygen supply, and noise abatement. Green zones throughout the city improve the city climate which is usually marked by a lower relative humidity (in some cases up to 7% less than in surrounding rural areas), warmer temperatures (the annual average temperature in urban areas is higher by 0.5 to 1.5 C, the daily average may be higher by 4 to 10 C), and higher absorption of solar radiation by haze and aerosols. Leaves and needles of evergreen plants absorb 10 to 30 mg dust/100 sq cm in three precipitation-free summer weeks; in three winter weeks with precipitation they absorb two to seven times as much. With densely planted green belts the maximum dust concentration is found on the windward side, with loosely planted green belts the maximum dust concentration is found right behind the belt. Repeated green belts in regular intervals of varying thickness are the most efficient dust traps. As for the filtering effect of gases such as carbon monoxide, and sulfur dioxide, 3-month measurement series was taken during the vegetation period 1970. The 50% values of the sum frequency of SO2 half-hourly-averages in urban and recreation zones were about the same, namely 60 and 66 micrograms SO2/cu m air. The 95% values were higher in urban zones (360) than in recreational green belts (250 micrograms/cu m). The 97.5% value was 465 micrograms SO2/cu m in urban zones and 318 micrograms in green belts.

28484 **APTIC NO. 50370**

Ohira, Toshio, Tadashi Sawada, Tetsuto Komeiji, Isamu Nouchi, Kuniko Oguchi, Hou Negishi, Motoki Iwasami, and Toshio Asaka

PLANT DAMAGES BY O3 EXPOSURE AND BY HIGH CONCENTRATION OXIDANTS. *(Shokubutsu no O3 bakuro to konodo okishidanto hasseiji ni mirareru higai jokyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), no. 4:99-106. 8 refs.*

Experiments of plant damage by high concentration oxidants were conducted using an exposure chamber and ozone. Ozone created by an ozone producer was diluted by clean air, and the flow was controlled by the electric pressure control and air flow control. The ozone concentration was maintained at approximately 20 pphm at all times by the chemiluminescence automatic ozone meter. The exposure time was 6 hr daily between 10 and 4, and when no damage symptoms were noted, the operation was continued until signs appeared. The chamber temperature was 30 C during the day and 20 C during the night, and humidity was 60-90%. Light was 50-150 lux on sunny days and 5-20 lux on rainy or cloudy days. The damage conditions were classified into five levels, and also judged by the area of damages. The discoloration symptoms appeared in 3 hr on green vegetables, soybeans, and alfalfa. The most resistant plants were cauliflower, onion, and corn, which showed the symptoms in 18-42 hr. In between, turnips, lettuce, cucumbers, string beans, carrots, tomatoes, and morning glories reacted. Those with the greatest degrees of damage and the largest damage area ratio were green vegetables, cucumber, and alfalfa. Lettuce, turnips, corn, and petunia showed relatively slight damage. The resistance was generally higher among the trees than among the annuals and vegetables. Among the trees, Carolina poplars were the most susceptible, followed by cherry, and plane trees. Himalayan cedar and gingko tree were extremely strong.

28485 **APTIC NO. 50173**

Tanaka, Hirofumi, Toshiharu Takanashi, Masaya Kadota, and Michihiko Yatazawa

EXPERIMENTAL STUDIES ON SULFUR DIOXIDE INJURIES IN HIGHER PLANTS. *Water, Air, Soil Pollut., 1(4):343-346, Sept. 1972. 3 refs.*

Photosynthesis was reversibly inhibited by exposing plants to sulfur dioxide. The formation of alpha-hydroxy sulfonate in the exposed plants was suggested as one of the effects, because this compound inhibited glycolic oxidase which is necessary in the glycolic acid pathway. The suppression of the glycolic acid path seemed to affect various aspects of plant metabolism, particularly the reduction of the biosynthesis of glycine and serine. The biosynthesis of these amino acids in plants exposed to sulfur dioxide was investigated to estimate the significance of the formation of alpha-hydroxy sulfonate in the plants. The results showed that photosynthetic formation of serine was reduced in the exposed plants, and that alpha-hydroxy sulfonate was formed. (Author abstract)

EFFECTS-MATERIALS

1973

28486 **APTIC NO. 50340**

Ericsson, R., B. Heimler, and N.-G. Vannerberg

THE INFLUENCE OF CARBON PARTICLES ON THE CORROSION OF IRON IN A HUMID, SULPHUR DIOXIDE-CONTAINING ATMOSPHERE. *Werkstoffe Korrosion, 24(3):207-209, March 1973. 14 refs.*

Iron samples covered with a thin layer of activated carbon were exposed to humid atmospheres at various relative humidities and with various sulfur dioxide contents. Contrary to expectation, the corrosion is initially faster at 55 and 65% relative humiditiy that at higher humidities. This phenomenon is attributed to adsorption of water vapor on activated charcoal, so that liquid films giving rise to corrosion can be formed at an earlier stage. After extended exposure, however, no accelerating effect can be attributed to the carbon particles.

28487 **APTIC NO. 50210**

Frey, Peter

AIR POLLUTION OR NORMAL DECAY? (Luftverunreinigung oder Verwitterung)? Text in German. Umwelt (Duesseldorf), 3(2):22-23, 1973.

The discussion concerning the causes of the decay of buildings and monuments was rescinded by a publication which claims that air pollution has nothing to do with stone decay. The publication appeared at a time a special measurement program was under way at the dome in Cologne which showed relationships between increasing decay of the dome and air pollution. The main argument supporting the claim that weather is the main agent causing decay is based on the repeated observation that the limestone is continuously exposed to sulfur-containing rain shows very little decay, but large decay at protected points. This observation is explained by the fact that the chemical decomposition process takes place at these protected points where condensation water accumulates. Particularly at these points the concentration of sulfuric acid is high which accelerates the decay. Points which are always hit by rain are less in danger because the rain washes the pollutants away before they can become effective.

28488 **APTIC NO. 50226**

Wickert, K.

ACCELERATED AND NON-ACCELERATED CORROSIONS, PARTICULARLY HCL CORROSIONS. *(Beschleunigte und nicht beschleunigte Korrosionen, insbesondere HCl-Korrosionen). Text in German. VGB Kraftwerkstechnik, 53(4):233-238, April 1973.*

Hydrogen chloride in gases with two components, nitrogen/HCl and air/HCl is very corrosive to steel. This is further enhanced in presence of sodium sulfate. In comparison, the effect of the gas mixtures nitrogen/water, air/water, N2/sulfur dioxide, and air/SO2 is rather mild even in the presence of Na2SO4. The latter alone reacts in N2 above 700 C and in air above 900 C steel. The gases N2/HCl/SO2 and air/HCl/SO2 cause the heaviest corrosion. The presence of H2O in N2/H2O/HCl/SO2 and air/H2O/HCl/SO2 has an impeding effect. Apart from Na2SO4, sodium chloride and calcium sulfate accelerate the N2/HCl corrosion. Magnesium sulfate impedes it up to 670 C. In experiments at a temperature of 700 C iron, silicon, aluminum, magnesium, and calcium oxides impeded the corrosion. Steel St42 reacts quite differently to HCl-containing gases than steel V2A. On steel St42, N2/SO2 has a much higher corroding effect above 440 C than air/HCl or N2/HCl. Hydrochloric acid-containing two-component gases are less corrosive on St42 steel with the exception of the presence of Na2SO4. With gases containing three and four components, the corrosion by air/H2O/SO2 below 550 C is less than with gas mixtures containing HCl such as N2/HCl/SO2 and air/H2O/SO2. Apart from Na2SO4, NaCl, CaSO4, magnesium sulfate, and ferric oxide accelerate the reaction between St42 steel and N2/HCl-gas.

1969

28489 **APTIC NO. 50236**

Barton, K. and K. Bartonova

THE ACCELERATING EFFECT OF SULPHUR DIOXIDE AND WATER ON THE ATMOSPHERIC CORROSION OF RUSTY IRON. *Werkstoffe Korrosion, vol. 20:216-221, March 1969. 23 refs. Translated from German. British Iron and Steel Industry Translation Service, London (England), 15p., Jan. 1970.*

The mechanism and kinetics for the atmospheric corrosion of steel in the steady-state period were studied under laboratory conditions and in mathematical models for rusty steel in an atmosphere of 1, 10, and 100 ppm of sulfur dioxide and a temperature of 30 C. The correlation of the corrosion rate with humidity, in the range between critical humidity and nearly 100% relative humidity, was represented by a rising quadratic parabolic equation. The experimental procedures and mathematical calculations are examined.

EFFECTS-ECONOMIC

1973

28490 **APTIC NO. 50365**

Heitland, S.

A PROBLEM OF AUTOMOBILE EXHAUST DECONTAMINATION: COST-BENEFIT CONSIDERATIONS. *(Ein Problem der Abgasentgiftung: Kosten-Nutzen Ueberlegung). Text in German. Automobiltech. Z. (Stuttgart), 75(4):151-152,, 1973. (Presented at the VDA-Kolloquium, Berlin, 1972.)*

For estimation of the cost-benefit ratio of automobile exhaust decontamination, a simplified model of the exhaust gas problem is used. The number of polluting automobiles is determined by the difference of the number of automobiles registered and those whose registration was cancelled. According to the desired degree of atuomobile exhaust cleaning, higher costs now occur for newly registered cars. These higher costs are composed of investment costs for the exhaust gas cleaning devices and the maintenance and service costs during the entire lifetime of the car. For a VW, the investment costs for an afterburner with 90% efficiency were estimated to amount to $330. The estimate is based on the state-of-the-art of 1971. For an 80% efficiency, the investment costs would be half as high, for a 50% reduction of the pollutants only one-fourth. The maintenance and service costs for the afterburner amount to a multiple of the investment costs due to the higher fuel consumption and the low lifetime of individual components. For determination of the benefits of the afterburner efficiencies, the pollution by automobiles for the decade 1976-1985 under consideration by the U. S. legislation was used. At a cleaning efficiency of 90%, the total cost exceeds the achievable benefit by more than double.

1972

28491 **APTIC NO. 50386**

Veylon, R.

THE WAR ON POLLUTION. A SHORT REVIEW OVER ITS FINANCIAL AND SOCIAL CONSEQUENCES IN FRANCE. *(La lutte contre la pollution. Bref apercu sur ses consequences financieres et sociales en France. Text in French. Arch. Maladies Profess. Med. Trav. Securite Sociale (Paris), 33(10-11):595-598, Oct.-Nov. 1972. 1 ref.*

Financial and social implications of environmental protection in general and of air pollution control in particular in France are surveyed. Industrial expenditures for air pollution control are estimated at 25% of the corresponding national outlay. The respective percentages for thermal power plants, cement industry, and textile and plastic industry are 0.5%, 3%, and 10%. The polluter-must-pay-principle, which is reasonable for newly-established facilities, is unjust for old, relatively obsolete plants which would be treated by the application of such a principle. Pollution control-related investmant can be furthered by both granting financial aid, accelerated writeoff, interest bonuses, and other incentives, or by imposing taxes on polluting operations.

28492 **APTIC NO. 50235**

Watson, Donald E.

COST-BENEFIT RELATIONS IN AIR QUALITY STANDARDS: BIOMEDICAL RESEARCH FOR ASSESSING THE HEALTH COSTS OF AIR POLLUTION. *California Univ., Livermore, Lawrence Livermore Lab., AEC Contract W-7405-Eng-48, UCRL-51282, 15p., Sept. 27, 1972. 12 refs.*

NTIS: UCRL-51282

Community air quality standards are set to reflect the costs and benefits of air pollution control measures. The costs of air pollution are both intrinsic (effects) and extrinsic (prices). Biomedical scientists are concerned with evaluating intrinsic costs, but standards are set by representatives of society who evaluate extrinsic costs. Biomedical science is limited in meeting the expectations of the lay public since causality cannot be proven by epidemiological methods, the range of human experimentation is highly restricted, and results of animal experimentation may be misleading when applied to man. Furthermore, focusing on the quantification of known effects alone will result in inadequate assessment, as these effects are undoubtedly outnumbered by still unrecognized effects. Current methods for studying the effects of pollutants include biochemical, cellular, pathophysiological, pathogenetic, and epidemiological techniques. Mechanisms are studied in the fundamental molecular and cellular systems; societal costs are best determined by epidemiology and pathophysiology. (Author abstract modified)

STANDARDS AND CRITERIA

1973

28493 **APTIC NO. 50169**

Central Council for Pollution Countermeasures (Japan), Committee on the Atmosphere

A REPORT BY THE SPECIAL COMMITTEE ON THE ENVIRONMENTAL STANDARD FOR SULFUR OXIDES. *(Io sankabutsu ni kakawaru kankyo kijun ni tsuite no senmon iinkai hokoku). Text in Japanese. 14p., March 1973.*

According to the report of the Living Environment Council Committee for the Environmental Standards, dated 1973, the minimal conditions for acceptable sulfur dioxide concentration are as follows: the environment has not been proven epidemiologically that it has affected the morbidity and mortality of patients; undesirable reactions and damage to young people s respiratory system have not been proven epidemiologically. The effects of suspended particulates, and the multiplied effects of SO2 in the presence of nitrogen oxides and especially of nitrogen dioxide have been proven in experiments. According to the investigations in Osaka, the morbidity tends to increase when the 24-hour average of the hourly measurements of SO2 is more than 0.1 ppm. When SO2 concentration drastically increased and a 6-day average reached 0.12 ppm, the morbidity of circulatory disease patients increased greatly. In Yokkaichi, when the daily maximum average was 0.1 ppm, and 10% of the year s 24-hour averages exceeded 0.07 ppm, the morbidity of respiratory system patients increased by two times, and the absence rate of children with respiratory diseases increased by three times. Other such epidemiological study results from various cities on the effects of SO2 are briefly discussed.

28494 **APTIC NO. 50170**

Japan Environmental Agency, Tokyo Bureau of Atmospheric Safety

THE REVISION OF THE ENVIRONMENTAL STANDARD FOR SULFUR OXIDES. *(Io sankabutsu ni kakawaru kankyo kijun no kaisei ni tsuite). Text in Japanese. 13p., March 1973.*

The revision of the sulfur oxides standards in the environment by the Japan Environmental Agency was based on the recommendations of the Special Committee on the Environmental Standards of the Living Environment Council. Since the measurements of SOx by the standard electroconductivity method do not include sulfur trioxide, the discussions of SOx mainly concentrated on sulfur dioxide. The new standards for SO2 concentration in the environment is less than 0.04 ppm/hr based on 24 hour measurements, or 0.1 ppm based on 1-hour measurements. The recommendations of the Special Committee were based on the findings from human and animal experiments and epidemiological studies of various existing data throughout Japan. The findings were that SO2 both stimulated and damaged the respiratory system, lowered the resistance of the human respiratory system bacteria and virus, and multiplied the damages in the presence of suspended particulates and nitrogen oxides. When 3% morbidity based on continuous coughing and sputum discharge for more than 3 months occurred, the atmosphere was considered undesirable, instead of the previous 5% morbidity. Such levels in the actual environment occurred in environments with SO2 concentrations between 0.022 and 0.035 ppm. Various factors which lead to the decision of the revised standards are briefly discussed. The chronological development of the studies made by the Special Committee is presented in a table.

28495 **APTIC NO. 50348**

Kanno, Saburo and Syozo Fukui

THE CHARACTERISTICS OF THE POLLUTION CONTROL ORDINANCE OF KANAGAWA PREFECTURE. *(Kanagawa-ken ni okeru kogai boshi jorei no kangaekata to tokucho). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):39-45, Feb. 1973.*

Calculations of environmental standards for sulfur oxide concentration and waste water quality are given. The emission standard of SOx is based on an atmospheric diffusion equation and is determined by the ground level concentration which in turn is determined by effective stack height. Efforts were made to control the total SOx emission from factory complexes in Yokohama city and Kawasaki city. Results of an investigation showed that the SOx concentrations at 12 locations decreased in the past few years. However, in one area in Kawasaki city, the SOx concentration was still exceeding the environmental standard of 0.05 ppm. Analytical methods are mentioned.

1972

28496 **APTIC NO. 50177**

Kettner, Helmut

POLLUTANT STANDARDS OF THE ATMOSPHERIC AIR IN THE SOVIET UNION. MAXIMUM ALLOWABLE EMISSION CONCENTRATIONS AND PROTECTIVE ZONES 1972. *(Schadstoff-Normierung der Aussenluft in der Sowjetunion. MIK-Werte und Schutzzonen 1972). Text in German. Schriftenreihe Ver. Wasser-, Boden- Lufthyg. (Berlin), no. 39:5-40, 1972. 10 refs.*

New maximum allowable emission concentrations were issued in the Soviet Union in July 1972. The short-term maximum allowable emission values may not be exceeded in the Soviet Union at any time. The long-term maximum allowable values are the average values measured over a period of 24 hours. All short-term and long-term maximum values are listed in a table. For sulfur dioxide the short-term maximum allowable concentration is 0.5 mg/cu m, the long-term is 0.05 mg/cu m; for nitrogen dioxide it is 0.085 in both cases; for carbon monoxide 3 mg/cu m and 1 mg/cu m, respectively; for lead the long-term concentration is 0.0007 mg/cu m. Regular inspection measurements are taken. The measurements are still taken manually between 8 and 11 am and 4 and 6 pm. In Moscow the SO2, dust, NO2 and soot concentrations have been monitored at 27 points since 1951. Emission measurements are presently being taken in 226 cities. The analytical methods for the determination of SO2, hydrogen sulfide, carbon disulfide, chlorine, hydrogen fluoride, NO2, phenols, CO, dust, and soot are described in guidelines. The short-term maximum allowable concentrations are important for the calculation of stack heights. Industries requiring protective belts are listed.

1970

28497 **APTIC NO. 50233**

Stanko, James Joseph

AN INVESTIGATION INTO THE PROCESS OF ESTABLISHING AMBIENT AIR QUALITY STANDARDS. *Oklahoma Univ., Oklahoma City, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1970, 96p., 36 refs.*

Opinions and attitudes of various state air pollution control board chairmen were probed regarding air pollution control and ambient air quality standard related problems. The results of this survey seem to indicate that the typical board chairman is a college graduate with possibly more than one degree in either the healing arts or engineering and speaks for either business or industry. For the most part he is uncertain of what value or range of values and under what conditions such values constitute a desirable standard for total particulate matter and sulfur dioxide concentrations, in the ambient air. He is strongly opinionated that the Federal Government should promulgate criteria based on hard scientific data but leave the setting of standards, based on these criteria, up to the individual states. He believes his activities are nonpartisan and in the best interest of the citizens of his state. The findings indicate that there is no meaningful consensus among board chairmen in regard to what value or range of values would be desirable in their various states as standards for total particulate matter and sulfur dioxide concentrations in the ambient air. This may be due to the confusion among the board chairmen arising primarily from the failure of the Federal Government to impart sufficient information to the states in time for them to adopt their own standards as mandated the Federal 1967 Air Quality Act. The various states appear to want to establish their own standards but only after the Federal Government provides the guidelines and suggests those values which constitute ambient air quality criteria.

LEGAL AND ADMINISTRATIVE

1973

28498 APTIC NO. 50025

Takaishi Municipal Government (Japan)

AIR POLLUTION MONITORING CENTER. *(Taiki osen kanshi senta). Text in Japanese. 9p., 1973.*

The city of Takaishi has four stations equipped with automatic air pollution measuring apparatuses and meters for measuring wind velocity and wind direction. The data were sent to a monitoring center where the data were calculated and the results were continuously shown on a flashing board. The air pollutants subjected to the continuous monitoring were sulfur oxide and particulates.

28499 APTIC NO. 50180

Japan Environmental Agency, Tokyo, Bureau of Atmospheric Safety

INSTRUCTIONAL DATA ON MATERIAL CONCERNING THE ATMOSPHERIC SAFETY BUREAU, FROM THE ALL-JAPAN POLLUTION CONTROL ADMINISTRATORS CONFERENCE. *(Zenkoku kogai kankei shukanka(bu)cho kaigi taiki hozenkyoku kankei setsumei shiryo). Text in Japanese. 104p., Feb. 1973.*

Countermeasures on photochemical smog, offensive odors, urban air pollution, noise, and vibration are discussed. In 1972, 14 Prefectures issued warnings on photochemical smog, and the numbers of warnings increased in 13 Prefectures except in the Tokyo Metropolitan Area. The total warnings increased from 103 in 1971 to 176 in 1972. Air pollution monitoring networks for automatic measurements of sulfur oxides, nitrogen oxides, hydrocarbons, hydrogen fluoride, hydrogen sulfide, oxidants, ozone, and of metallic particulates were planned. In Dec. 1972, a new limitation for the allowable automotive exhaust gas was issued, and a remarkable decrease of exhaust gas pollution was expected. The environmental standards of some air pollutants in this country as well as in America, Russia, Sweden, Canada, and Czechoslovakia are also given.

28500 APTIC NO. 50312

TRW Transportation and Environmental Operations, McLean, Va., Land Use Planning Branch

TRANSPORTATION CONTROL STRATEGIES FOR THE STATE IMPLEMENTATION PLAN CITY OF PHILADELPHIA. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-0048, Proj. DU-72-B895, Pub. APTD-1370, 134p., Feb. 1973. 23 refs.*

NTIS: PB 218386

Transportation control strategies to achieve the required carbon monoxide air quality standards for the Philadelphia metropolitan area by 1977 were studied. The control plans were examined with respect to technical limitations, institutional obstacles, cost-effect parameters, and socio-economic factors. Air quality predictions were based on extant air quality measurements, projected emission reductions, and vehicle emission factors. The second highest measurement of CO concentration during 1971 was 22.5 mg/cu m 8 hour average, more than twice the national primary standard of 10 mg/cu m. To achieve the required reduction, a 56% decrease in CO concentration is needed. The recommended control strategy included curbside parking and loading regulations, inspection-maintenance, increased mass transportation ridership, vehicle restraints, vehicular-miles-of-transport controls, and central business district controls. Implementation and monitoring plans are reviewed.

28501 APTIC NO. 50368

Tokyo Metropolitan Government (Japan)

HEALTH PROTECTION MEASURES AGAINST PUBLIC NUISANCE. *(Kogai hoken taisaku). Text in Japanese. In: Tomin o kogai kara boei suru keikaku. (Plans for The Protection of Citizens from Public Nuisance). p. 343-354, 1973.*

The policies and plans of the Tokyo Metropolitan Government for the protection of citizens from public nuisance have three parts: special group health examinations; treatment of pollution victims; and investigation and research programs. In 1972, 13,200 people were examined. The examination consisted of tests for lung function and the effects of carbon monoxide and lead. A total of 122,000 people will be examined in groups between 1973 and 1981. Those who require a further health examination will be given detailed checkup of lung function heart, and blood. Between 1972 and 1976, questionnaires and detailed health examinations will be given to third to sixth graders. In addition, a total of 450,000 children will be examined for their general health and their living environment. Detailed health examinations and lung tests will be given to 13,500 children. The treatment plan will include the installation and completion of treatment facilities in various branches of Tokyo metropolitan hospitals, such as beds for pollution victims, and emergency treatment facilities for photochemical smog victims. The investigation and research programs include clinical investigations of chronic congestive lung patients, biochemical and pathological studies of pollution, specific effects of various pollutants on the human body, and the prognosis of respiratory disease patients. There will also be limited projects for specific pollutants such as cadmium, lead, oxidant, suspended particulates, organic mercury, various heavy metals, and polychlorinated biphenyls.

28502 APTIC NO. 50357

Eysel, K.

LEGAL QUESTIONS TO THE EMISSION PROBLEM. *(Rechtsfragen zum Immissionsproblem). Text in German. Landtechnik, 28(5):143-148, March 1973.*

Until mid-1971 the industrial regulations did not include agricultural enterprises. Since July 1971 paragraph 16 of these regulations was expanded to include hen farms from 20,000 animals onward, poultry frams from 30,000 onward, or pig farms from 1250 animals onward, with the exception of farms for the sole purpose of breeding of poultry. According to the law, the erection of such plants requires a special license. A number of court decisions exist concerning odor emission by such plants. If the odor emission is negligible the neighbor has to tolerate the emission. If the emission is considerable but characteristic of the village, the residents had to tolerate the emissions until 1959. Nowadays, however, the farmer is expected to install devices for the removal of odors. If he does not comply with this, he has to pay indemnities. If the odor emission is more than considerable and not characteristic of the village, the neighbor can effect the closing of the farm enterprise. The terms considerable and characteristic of a village have been interpreted by the courts quite unanimously. The odor emission is considerable also if intense odor occur only occasionally, e.g., on warm days. The courts did not turn considered only the immediate environment from where the charges came when considering the emission characteristics of a village.

28503 APTIC NO. 50283

Imai, Takeshi

TRENDS IN AUTOMOBILE EXHAUST CONTROL. *(Jidosha haishutsu gasu kisei no hoko). Text in Japanese. PPM (Japan), 4(2):71-75, Feb. 1973.*

Japanese standards for automobile exhausts from automobiles produced after April 1975 and April 1976 were changed on Oct. 5, 1972, taking into consideration the U. S. stanfards. In

July 1971 the authority to establish exhaust standards was transferred from the Ministry of Transportation to the Japan Environmental Agency. The Automobile Pollution Subcommittee of the Air Quality Committee recommended a reduction of the present carbon monoxide exhaust level by 89%, hydrocarbons by 93%, and nitrogen oxides by 62% in 1975 and 92% in 1976. Stationary sources were examined by another committee. The Automobile Pollution Subcommittee will also determine automobile engine operating modes comparable to actual travel conditions for use in testing, particulate emission standards, and the emission standards for automobiles using light oil as fuel.

28504 **APTIC NO. 50330**

Kube, Dietmar

THE EMISSION INVENTORY. *(Das Emissionskataster). Text in German. Chem. Ind. (Duesseldorf), 25(1):30-32, Jan. 1973.*

The state government of North Rhine Westphalia decided to create six zones in the Ruhr and Rhine area where all industrial air pollution sources and the emissions from domestic heaters and traffic could be monitored. The results of these measurements shall serve as basis for measures of improvement, for research and developmental tasks, for planning and legislative measures. The continued determination of the type and quantity of emissions in these zones will help to make long-term emission prognoses.

28505 **APTIC NO. 50377**

Nakano, Michio

AIR MONITORING ACTIVITY.-THE PRESENT SITUATION IN OSAKA CITY. *(Taiki osen joji kanshi-Osaka no genjo). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 12(1):28-38, Feb. 1973. 9 refs.*

In 1972, 56 plants which each consumed more than 10 kl/day of fuel were requested by the city government to install continuous air pollution monitoring apparatuses including a sulfur dioxide meter, oxygen meter, fuel flow meter, analyzer for sulfur in fuel, thermometer, and gas flow meter. Measurements of SO2 concentration in air by the conductivity method at 11 locations in the city showed a decrease of the average concentration from 0.074 ppm in 1966 to 0.054 ppm in 1971. In 1973, each plant consuming more than 5 kl/day of fuel will be requested to install the monitoring apparatus. More than 80% of the fuel consumed in the city will be accounted for by this new standard.

28506 **APTIC NO. 50220**

Schmitz, Paul

WORK GROUP FOR ENVIRONMENTAL PROBLEMS. *(Arbeitsgemeinschaft fuer Umweltfragen e.V.). Text in German. TUE (Tech. Ueberwach.), 14(2):56-57, Feb. 1973.*

The work group for environmental problems presently includes 40 representatives of institutions and associations, industrial enterprises, and public life. The next major task of the work group will be the creation of an Environment Forum which shall grant all groups concerned with environmental problems the opportunity to voice their concern. The work group holds the opinion that the creation of a Ministry of the Environment on the Federal level is not advisable for West Germany, it sponsors the creation of a Federal Bureau of Environmental Protection instead. This Bureau should be the planning body for protective measures on a national basis and should be the central information and documentation center for environmental problems. For the technical and scientific execution of the Federal Emission Protection Law and for research and counseling the future Federal Departments for Emission Protection and Refuse Disposal shall be made responsible. In the field of air pollution a switch to desulfurized fuel oils seems to be recommendable if the concentrations are about to exceed emission standards. Devices for the reduction of pollutant emission from cars should not effect the economic operation of automobiles, must also operate in old cars, and must reduce one pollutant concentration without raising the concentration of another.

28507 **APTIC NO. 50222**

Schwartz, Karl

WAYS AND AIMS IN THE AIR POLLUTION CONTROL OF THE GERMAN FEDERAL REPUBLIC. *(Voies et objectifs de la lutte contre la pollution atmospherique en Republique Federale Allemande). Text in French. Tribune Cebedeau (Centre Belge Etude Doc. Eaux), 26(350):5-14, Jan. 1973. (Presented at the CEBEDEAU Air Pollution Conference held in Liege, Belgium, May 19, 1972.)*

General problems of industrial and other emission control in West Germany, and the activity and organization of the VDI Commission for Clean Air Maintenance are described. Different committees of the VDI Commission deal with problems of the formation and prevention of emissions, of the dispersion and fallout of dust and gaseous pollutants, the effects of particulate and gaseous pollutants, measurement techniques, and specific technical and technological aspects of emission control. The legislation envisages centralization and intensification of legislative activities in the area of air pollution control, the protection of the natural environment, adequate waste management, and water protection. Minimum requirements on the construction and operation of stationary and mobile equipment regarding environmental impacts, and emission standards, and maximum allowable ground-level concentrations for planning and designing industrial facilities, will be set up. Pollution control equipment should be in accordance with the available technical and scientific standards. Combustion equipment-generated dust and soot emissions can now be reduced to 1% or lower by available separation techniques. Flue gas desulfurization pilot plants with 200-300 cu m/hr capacity are in operation, and further efforts will be made to provide adequate fuel and flue gas desulfurization techniques. Automotive exhaust idle carbon monoxide emissions and crankcase emissions have been limited by legislation, and the gasoline lead content has been limited to 0.4 g/l. Permanent monitoring of common pollutants, and special monitoring of certain pollutants hard to detect in the air will be conducted jointly.

1972

28508 **APTIC NO. 50096**

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

AIR POLLUTION CONTROL MEASURES: STATE OF IMPLEMENTATION OF MAIN REQUIREMENTS UNDER THE AIR POLLUTION CONTROL LAW. *(Taikiosen boshi taisaku: Taikiosen boshiho ni motozuku shuyojiko Jisshijokyo). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:109-118, Feb. 1972.*

According to a revision of a air pollution control law, all of Kanagawa Prefecture is subject to control criteria. There are 554 factories with 1995 sources of stack gas emission in the Yokohama-Kawasaki district and 283 facilities with 431 sources of stack gas emission in the rest of the Prefecture. The ground level sulfur oxide concentration should not exceed 0.011 ppm for Yokohama and Kawasaki and 0.020 ppm for the rest of the Prefecture. Inspections of emission sources and guidance will be provided by the Prefecture. The sources must submit a quarterly report on fuel used. Fuel oil and coal consumption increased by 15% and 16%, respectively, from 1969 to 1970. The sulfur content in heavy oil has been decreasing since 1965.

28509 **APTIC NO. 50102**

Kanagawa Prefecture Center for Public Nuisance Control (Japan)

ESTABLISHMENT OF PROCEDURES FOR ACTIONS TO BE TAKEN DURING AN AIR POLLUTION EMERGENCY. *(Taiki osen kinkyuji no sochiyoko no seitei ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Bull. Ind. Res. Inst. Kanagawa Prefecture), no. 14:119-124, Feb. 1972.*

The regulation establishing procedures to be taken when sulfur oxide exceeds a certain concentration and an air pollution emergency is proclaimed is discussed. The monitoring system, alarms, and procedures are described. When SOx is 0.2 ppm or higher in a 1-hour value and continues to be so for 3 hr, or when it is 0.3 ppm or higher for 2 hr, or when the 1-hour value for a 48-hour period is 0.15 ppm or higher, a warning should be issued and SOx-emitting sources are told to reduce SOx emissions.

28510 **APTIC NO. 50211**

Toyama Prefectural Government (Japan), Dept. of Public Nuisance

ENVIRONMENTAL PROTECTION MEASURES AGAINST SULFUR OXIDES. (THE BLUE-SKY PLAN). *(Io sankabutsu kankyo hozen taisaku ni tsuite (buru sukai keikaku)). Text in Japanese. 45p., Feb. 1972.*

Investigation showed that approximately 8300 tons of sulfur oxides were discharged in 1971 in five areas of Toyama Prefecture which were subjected to a pollution preventing plan. The plan was aiming at suppression of pollution from 1975 to 1978. Estimations of fuel consumption in 1975 and 1978 were demanded from the factories in the areas by the authorities. Maximum allowable quantities of SOx in 1975 and 1978 in the five areas were predicted from the estimated fuel consumption, the results of meteorological measurements, and the results of model calculations. The goal for 1978 was put at a yearly geometric average of 0.015 ppm, 99% of the 24-hour average below 0.050 ppm, and 99% of the 1-hour concentration below 0.10 ppm.

28511 **APTIC NO. 50275**

GCA Corp., Bedford, Mass., GCA Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN BALTIMORE, MARYLAND. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-0041, Proj. DU-72-B895, Pub-APTD-1443, 242p., Dec. 1972. 25 refs.*

NTIS: PB 218702

Transportation control strategies to achieve the carbon monoxide and oxidant air quality standards required for the Baltimore urban area by 1977 were studied. State implementation plans were analyzed to verify and assess the severity of the CO and oxidant pollutant problems, and the most promising transportation controls and their air quality impact were determined. The 1977 air quality predictions were based on extant air quality data, predicted stationary source emissions and traffic patterns, anticipated emission control techniques, anticipated growth patterns, and legal and political factors. A proportional model was constructed to assess topographical parameters; meteorological data; vehicle emissions; and air quality data on CO and oxidant concentrations. The technical, legal, institutional, sociological, and economic criteria of the control strategies were analyzed. The proposed optimal control package included traffic flow improvements, but transit service improvements, total subsidy of bus transit operations, mandatory retrofit of uncontrolled vehicles with catalytic converters and crankcase and evaporative controls, annual inspection, and mandatory maintenance. The implementation and monitoring programs are reviewed.

28512 **APTIC NO. 50276**

GCA Corp., Bedford, Mass., GCA Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN BOSTON, MASSACHUSETTS. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-041, Proj. DU-72-B895, Pub-APTD-1442, 289p., Dec. 1972. 24 refs.*

NTIS: PB 218715

Transportation control strategies to achieve the carbon monoxide and oxidant air quality standards required for the Boston metropolitan area by 1977 were studied. State implementation plans were analyzed to verify and assess the severity of the CO and oxidant pollutant problems, and the most promising transportation controls and their air quality impact were determined. The 1977 air quality predictions were based on extant air quality data, predicted stationary source emissions and traffic patterns, anticipated emission control techniques, anticipated growth patterns, and legal and political factors. A proportional model was constructed to assess topographical parameters; meteorology with respect to temperature, precipitation, wind speeds and direction, stability conditions, and their seasonal variations; vehicle emissions; and air quality data on CO and oxidant concentrations. The technical, legal, institutional, sociological, and economic criteria of the control strategies were analyzed. The optimal control package included inspection maintenance; a retrofit program through engine design and operation modifications and catalytic converters; and parking, transit, and traffic flow improvements. The implementation and monitoring programs are reviewed.

28513 **APTIC NO. 50277**

GCA Corp., Bedford, Mass., GCA Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN SALT LAKE CITY, UTAH. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-0041, Proj. DU-72-B895, Pub-APTD- 1445, 184p., Dec. 1972. 13 refs.*

NTIS: PB 218870

Transportation control strategies to achieve the carbon monoxide and oxidant air quality standards required to be met by the Salt Lake City urban area by 1977 were studied. State implementation plans were analyzed to verify and assess the severity of the CO and oxidant pollutant problems, and the most promising transportation controls and their air quality impact were determined. The 1977 air quality predictions were based on extant air quality data, predicted stationary source emissions and traffic patterns, anticipated emission control techniques, anticipated growth patterns, and legal and political factors. A model was constructed to assess topographical parameters; meteorology with respect to wind speed and direction, atmospheric movements, temperature, humidity, solar radiation, cloudiness, stability conditions, and their seasonal variations; vehicle emissions; and air quality data on CO and oxidants. The technical legal, institutional, sociological, and economic criteria of the control strategies were analyzed. The optimal control package proposed was traffic flow improvement through a computerized traffic signal system with mass transit development as a back-up strategy. The implementation and monitoring programs are reviewed.

28514 **APTIC NO. 50278**

GCA Corp., Bedford, Mass., GCA Technology Div.

TRANSPORTATION CONTROLS TO REDUCE MOTOR VEHICLE EMISSIONS IN PITTSBURGH, PENNSYLVANIA. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-0041, Pub-APTD-1446, Proj. DU-72-B895, 298p., Dec. 1972. 79 refs.*

NTIS: PB 218703

Transportation control strategies to achieve the carbon monoxide and oxidant air quality standards required for the Pittsburgh urban area by 1977 were studied. State implementation plans were analyzed to verify and assess the severity of the CO and oxidant pollutant problems, and the most promising transportation controls and their air quality impact were determined. The 1977 air quality predictions were based on extant air quality data, predicted stationary source emissions and traffic patterns, anticipated emission control techniques, anticipated growth patterns, and legal and political factors. A proportional model was constructed to assess topographical parameters; meteorology with respect to wind speed and direction, precipitation, cloudiness, stability conditions, temperature patterns, and their seasonal variations; vehicle emissions; and air quality data on CO, hydrocarbon, and ozone concentrations. The technical, legal, institutional, sociological, and economic criteria of the control strategies were analyzed. The optimal control package included vehicle inspection and maintenance, traffic flow improvements through street improvement, improved short-term mass transit, taxation, and the retrofit program involving the use of oxidizing catalytic converters on cars. The implementation and monitoring programs are reviewed.

28515 APTIC NO. 50311

TRW Transportation and Environmental Operations, McLean, Va., Land Use Planning Branch

TRANSPORTATION CONTROL STRATEGY FOR THE DAYTON METROPOLITAN AREA. (FINAL REPORT). *Office of Air Quality Planning and Standards Contract 68-02-0048, Proj. DU-72-B895, Pub. APTD-1367, 85p., Dec. 1972. 22 refs.*

NTIS: PB 218649

Transportation control strategies to achieve the required oxidant air quality standard for the Dayton metropolitan area by 1977 were studied. Based on extant air quality measurements and emission inventory data, a reduction of 58% in hydrocarbon emissions is required to achieve the national ambient air quality standards. The control programs were examined with respect to technical and institutional limitations, economic factors, social parameters, and implementation plans. The proposed control program included increased use of the mass transit system and inspection-maintenance to private vehicles with back-up through an air quality monitoring program and the implementation of an episode control strategy.

28516 APTIC NO. 50082

Boisseree, Klaus

NEW STRATEGIES IN ENVIRONMENTAL PROTECTION. *(Neue Strategien im Umweltschutz). Text in German. Luftverunreinigung, 1972:1-6, Dec. 1972. (Presented at the Arbeitsgemeinschraft fuer Rationalisierung, Duesseldorf, West Germany, Oct. 12, 1972.)*

The protection of the environment should be integrated into all technical and economic planning, into research or consumption, and into legislation. This means that for any new process which is developed, the environmental influences and effects should be studied at the same time, and non-polluting alternatives should be taken into consideration. Thus, the economic effects must be studied and the best and most economical solution should be found. Comprehension of non-polluting factors and the development of control programs and forecasts for the future are needed. The concern with environmental pollution can lead to fruitful and profitable results as the example of the elimination of brown smoke shows. The replacement of the Thomas converter not only eliminated the dust emission but improved the productivity. A similar example is the double contact process for the production of sulfuric acid. It reduced the emission of sulfur-containing waste gases and increased the productivity. By some measures several environmental pollution problems can be solved simultaneously; for instance the return of refinery off-gas to the combustion process, which eliminates the soot and noise simultaneously.

28517 APTIC NO. 50369

Ferraiola, G., G. Fumarola, and M. Del Borghi

THE ECOLOGICAL ROLE OF CHEMICAL PLANTS VIEWED IN TERMS OF SYSTEMS ANALYSIS AND ENGINEERING. *(Il ruolo ecologico dell impiantistica chimica nel quadro dell analisi dell ingegneria dei sistemi). Text in Italian. Riv. Combust. (Milan), 26(12):430-444, Dec. 1972. 21 refs. (Presented at the Congresso Nazionale di Chimica, 11th, Perugia, Oct. 19-21, 1972.)*

Environmental pollution problems are dealt with by systems engineering, and the principal water and air pollution sources related to industrial chemical activities are identified and analyzed. Pollution control criteria are classified along strategic and tactical lines as they apply to chemical engineering. Optimal technical, economic, and ecological solutions (with limits imposed by air and water quality standards) arrived at by the systems approach are proposed. The ecotechnical contribution of systems analysis is based on an analysis of interconnected factors which condition the productive system and influence its objectives, on a definition and analysis of all variables which condition the attainment of objectives and quantitative assessment of their corresponding roles, and on a comparative examination of strategic or of tactical alternatives of ecotechnical intervention from the project stage to the construction stage without exclusion of eventual revision of objectives. Optimalization of ecological solutions is dependent on the availability of necessary minimal financial means which will differ depending on the stringency of standards to be achieved and on the desired short or long term effects expected.

28518 APTIC NO. 50029

Schaetzle, P.

AIR HYGIENIC INSPECTION OF DOMESTIC OIL FIRING SYSTEMS. *(Lufthygienische Kontrollen bei haeuslichen Oelfeuerungs- Anlagen). Text in German. Gesundheitstech., 6(12):244-245, 1972.*

The health inspectorate of the city of Zurich for the first time inspected all domestic oil-firing-systems of Zurich in the winter of 1961/62 for soot emissions and unburned oil. The results of the inspection of about 1000 systems were so unfavorable, that the city of Zurich decided to continue the inspections and expand them. In the meantime about 100 municipalities followed the example of Zurich and declared the inspection of domestic oil firing systems mandatory. The inspections are carried out by personnel from the municipality. Special training for the personnel was started in fall of 1971.

28519 APTIC NO. 50380

Schlaug, H.

THE LICENSING PROCESS FOR A SELECTED SITE AND THE ERECTION OF INDUSTRIAL PLANTS. *(Genehmigungsverfahren fuer die Standortwahl und Errichtung von Industrieanlagen). Text in German. Tech. Mitt., 65(11):534-538, Nov. 1972.*

In the past few years environmental factors have increasingly influenced the licensing process for the selection of a site and the erection of new industrial plants. New laws and regulations have been passed which affect the licensing process. They are the Emission Protection Law of April 30, 1962 valid for the State of North Rhine Westphalia, The Technical Directives for the Maintenance of Clean Air of Sept. 8, 1964 and the laws modifying the industrial regulations of Dec. 22, 1959. Other laws were passed for regulation of water bodies. According to the Technical Directives for the Maintenance of Clean Air, the most important existing law regulating the emission of air pollutants, [illegible] industrial plant may be authorized only if it is equipped with adequate facilities for limiting, distributing, and monitoring emissions and if existing emission limit values are not exceeded. The first emission limits which were set were those for dust and sulfur dioxide. Through the use of low-sulfur fuels and the installation of high stacks and dust collectors the emission of these two pollutants has been reduced. At the moment all efforts of the authorities are directed towards a reduction of the emission of hydrocarbons. No suitable measuring method yielding reproducible results is yet available for many hydrocarbons, thus no emission measurements have yet been taken and the maximum allowable limit values are still being discussed.

GENERAL

1973

28520 **APTIC NO. 58382**

Dreher, Juergen

EVERYTHING FOR FRESH AIR. *(Alles fuer die Frischluft). Text in German. Umwelt Duesseldorf, 3(1):39-41, 1973.*

Stuttgart is an environment-conscious city. It knew very early that it has to protect its fresh air supply by prohibiting the surrounding green slopes from being urbanized. Stuttgart is located in a basin. It has 600 industrial enterprises, nearly 7000 commercial enterprises, and 200,000 automobiles. Since most of the citys air pollution comes from the combustion of coal and oil, great efforts have been undertaken to switch to gas, electricity, and remote heat. The erection of the incinerator in Stuttgart-Muenster reduced the number of small and medium incinerators and improved the quality of the air. The city s power plants have begun to switch to natural gas operation.

28521 **APTIC NO. 58324**

Kuonen, V.

GROUND AND ROAD FOUNDATION. *(Boden und Strassenunterbau). Text in German. Schweiz. Bauztg., 91(10):235-240, March 8, 1973. 12 refs. (Presented at the Gasoline and Petroleum AG Zurich, Conference, Bern, Switzerland, Jan. 23, 1973.)*

At the removal of soil for the construction of road foundations much dust is produced and a large quantity of exhaust gas is emitted by the scrapers, bulldozers, and similar machines. In order to avoid this a method has been introduced in Great Britain which uses belt conveyors and bucket-wheel excavators. Two bucket-wheel excavators dig the soil from a vertical wall and throw it on the belt conveyors which rest on crawlers. The belt conveyors can be easily brought into any desired position. The material is transported by these belt conveyors up to distance of 10.5 km. The second major source of dust development and environmental pollution is the transport of gravel to the road construction site. It is therefore desirable to look for methods which require lesser quantities. In this connection ground stabilization with lime, cement, and bituminous binding agents has made great progress. In various experiments it could be proved that the bearing strength of lime stabilized layers is equal to the non-bound gravel. About 50 to 70% of gravel can be saved if the uppermost layer of 16 to 18 cm of the road foundation has been stabilized by lime.

1972

28522 **APTIC NO. 58239**

Swedish Centre of Technical Terminology

GLOSSARY OF ENVIRONMENTAL TERMS. *(Miljoordlista). TNC 50, 96p., 1972.*

A Swedish, English, French, and German multilingual glossary of 777 environmental terms is presented. The multilingual glossary is followed by separate German, French, and English alphabetic indices.

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